CIO

THE MAGAZINE FOR INFORMATION EXECUTIVES

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COVER STORY

How To Drive Down The Cost Of Downtime

ALSO INSIDE

Continental Ops: CIOs In Europe

Integram St. Louis Seating's
Scott McMahon

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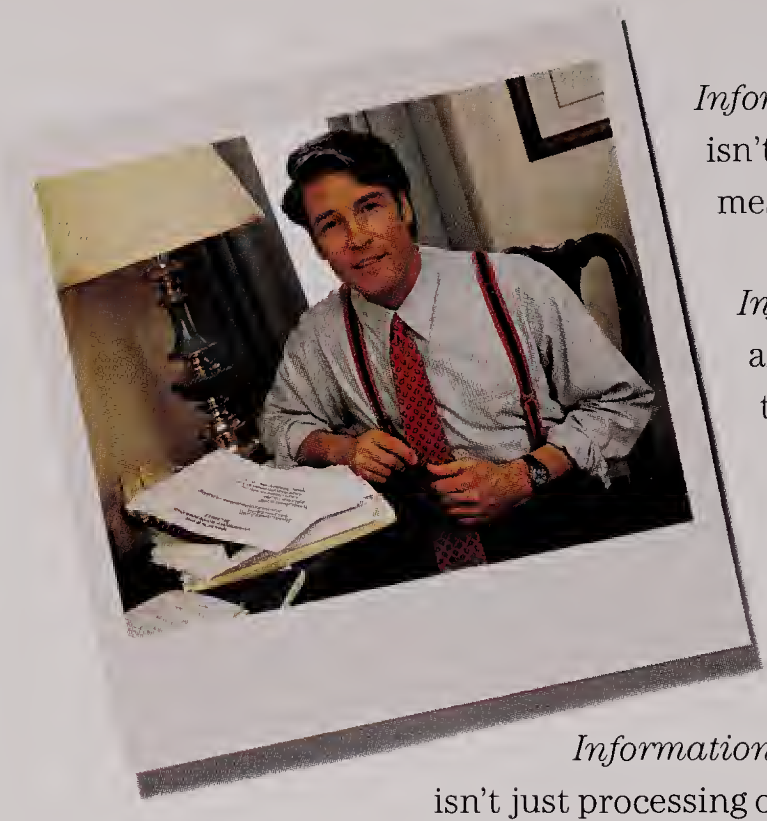
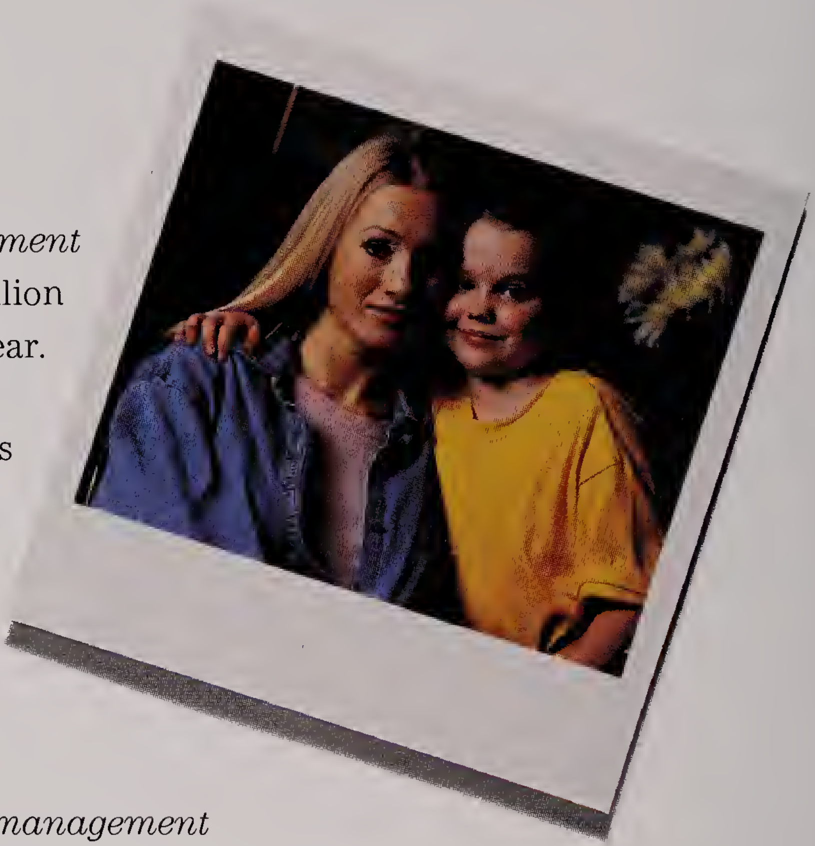


Information management isn't just processing 3 million voice messages every day.

Information management also helps Tom Welch confirm that the big deal went through.



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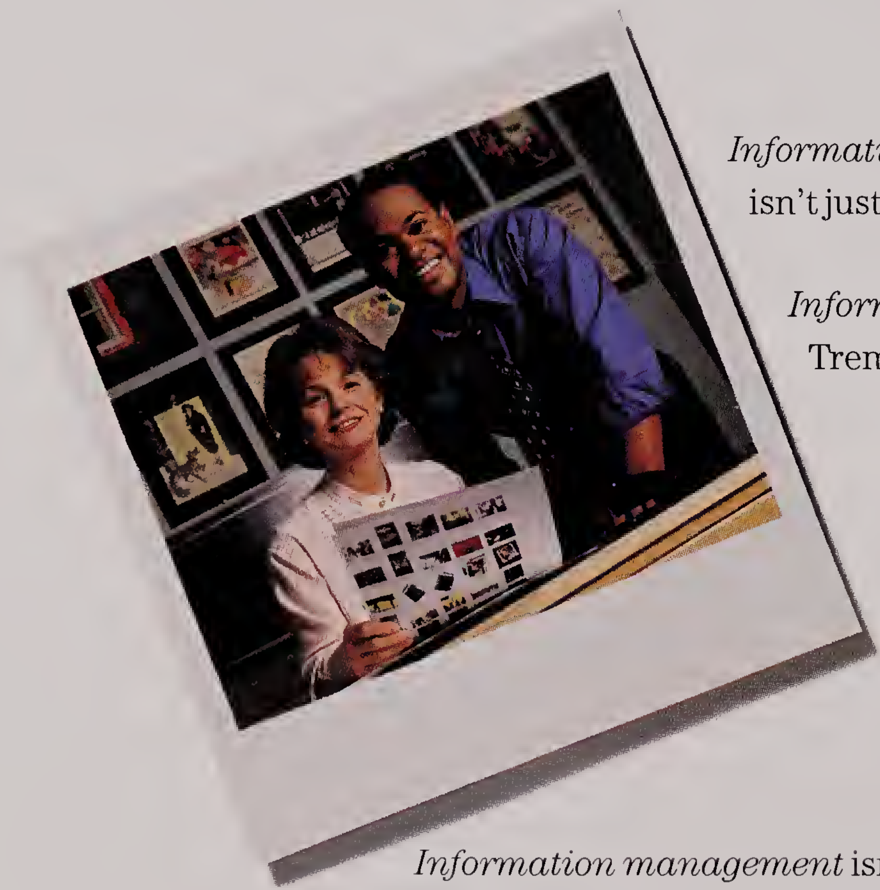

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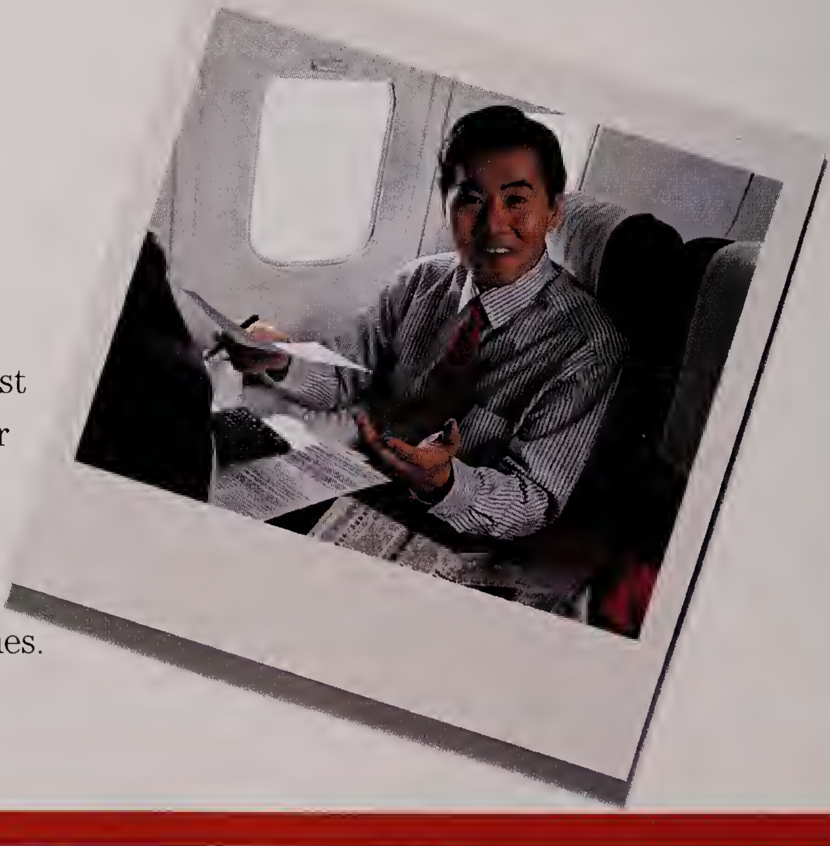

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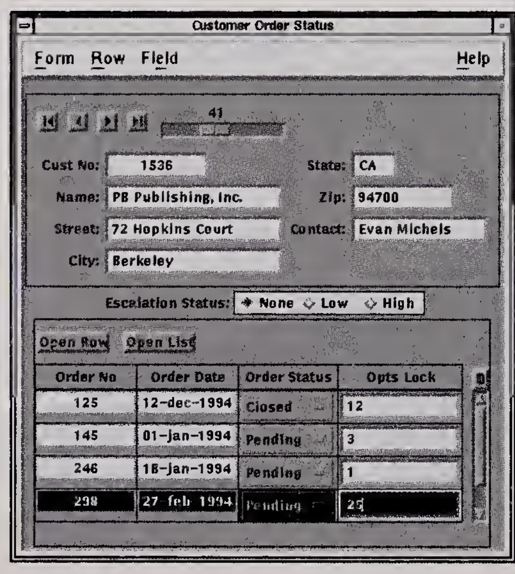

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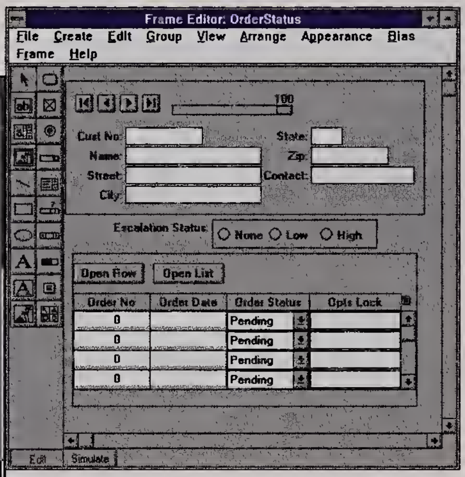

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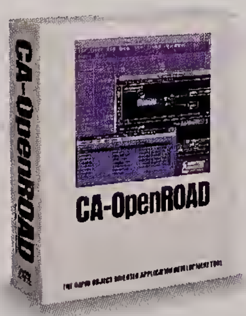

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CIO

VOLUME 8, NUMBER 16

COVER STORY

DOWNTIME **48**

Daring to Look Down

No one likes to think about computer downtime, but pretending that it can't happen is asking for even worse trouble. Before preparations can begin, CIOs must accept the inevitability of such failures and do their best to estimate the costs.

By Mickey Williamson

Ensuring a smooth ride **48**
Cover photo by Marc Berlow

CIO

Call for Entries

Enterprise Value Awards

DEADLINE: JULY 1, 1995

Enterprise Value Awards application follows Page **32**

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A European Tour

For many companies, cultural, geographical and technological conditions in Europe impose barriers to the effective deployment of strategic information systems.

By Jack Ewing

Taking on the world **38**

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Due Processing of Law

The judicious use of IT can improve law firms' ability to communicate and manage huge volumes of documentation.

By Megan Santosus

INTERVIEW: PAUL KRUGMAN **72**

Magic Numbers, Persuasive Sounds

As rival economic ideologies slug it out and policymakers look for easy answers to today's complex problems, one voice speaks out clearly against all the "fuzzy thinking" that abounds.

By E.B. Baatz

Straight talk **72**

MORE ►►►

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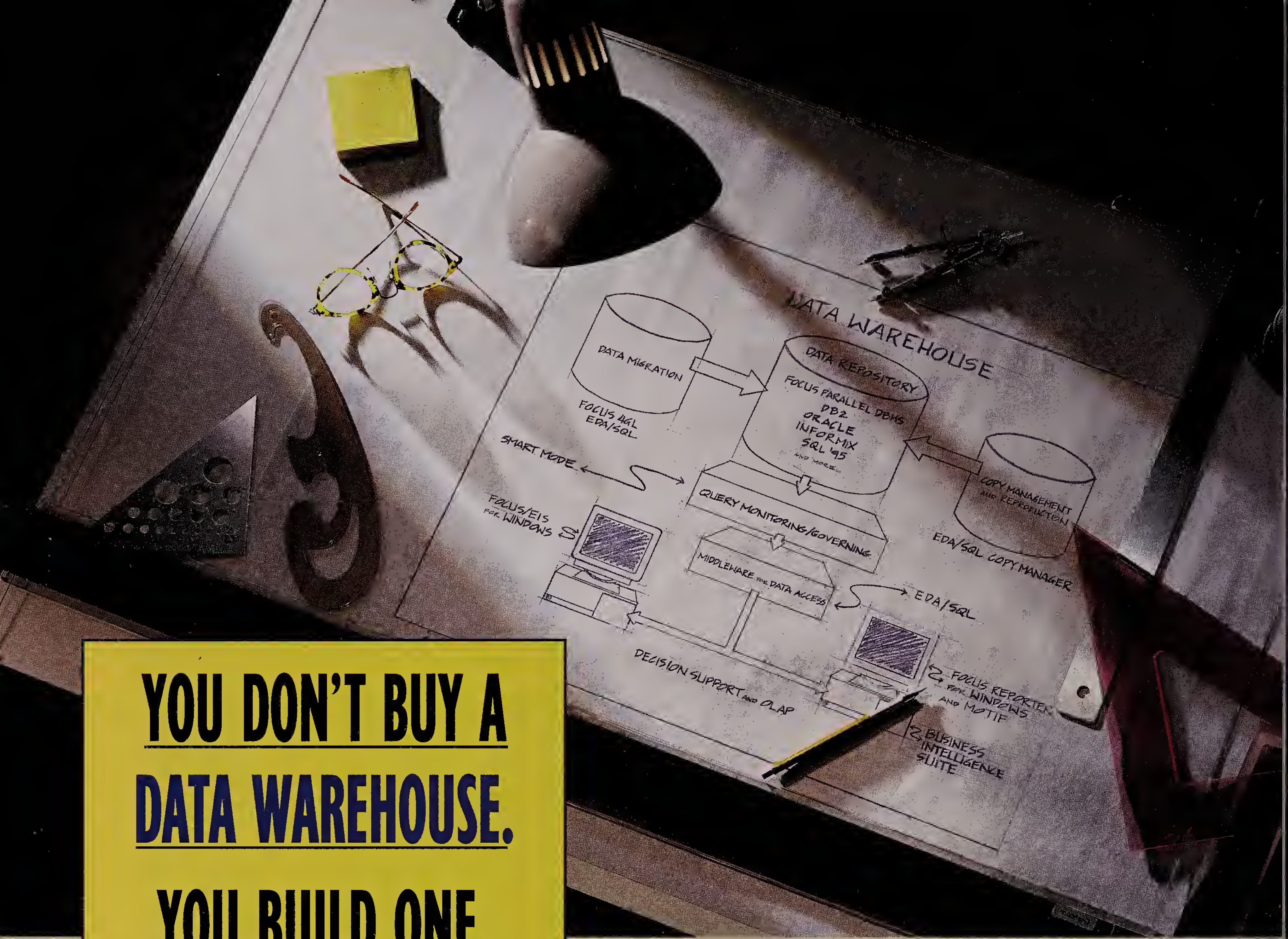
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RULE #4: START ASKING QUESTIONS AND YOU'LL START GETTING ANSWERS!

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CIO

COLUMNS

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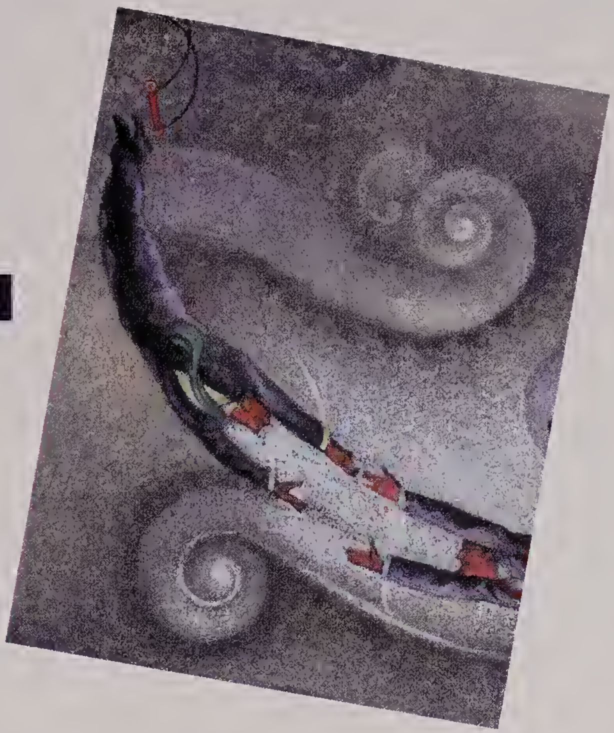
WEBMASTER: E-MAIL BONDING

Electronic mailing lists are a way for groups of people with common interests to meet and hold discussions in cyberspace. By helping IS executives worldwide find each other electronically, these lists can be a valuable tool for professional networking and communications.

By Dennis W. Viehland



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Border crossing **32**

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INSIGHTS: BEYOND BORDERS

International boundaries don't necessarily demark differences in consumer tastes. Nor should they dictate how you run your company—or your IS organization.

By Donald A. Marchand

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STATE OF THE ART: BRAVE NEW WORLD

Multimedia technology promises a journey into the future limited only by the imagination. But getting started will require some realistic planning.

By Alan R. Earls

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OUTLOOK: THE HOT SEAT AGAIN

According to the eighth annual CSC survey of critical IS issues, CIOs are as beleaguered as ever.

By James P. Saviano

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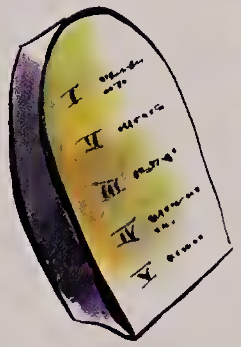

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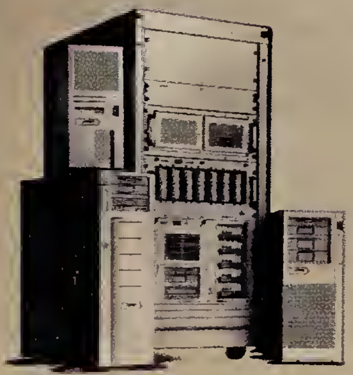

People are born with one. Businesses have to build them from scratch. To help you assemble the most reliable information backbone, Compaq announces a new generation of servers. They're all designed to faithfully serve the demands of workgroups and departments — from the expandable ProSignia line to the business-critical ProLiant family (with up to four Pentium processors). And they're all engineered to do what every

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LETTER FROM THE EDITOR

The importance of information management is not confined to leading edge, U.S.-based companies. Nor are the obstacles IS executives struggle to overcome.

Contributing Writer Jack Ewing reports from the Continent that CIOs in Europe (or IS managers, which seems to be the preferred term there) must battle cultural, geographical, regulatory and technological barriers to strategic deployment of information systems. (Please see "A European Tour," beginning on Page 38.) The business practices of Europe remain mostly bound in tradition—those orderly, deliberate and established procedures that Europeans respect but Americans disdain. IT deployment in conventional European companies typically lags behind that in the United States by many months.

There are exceptions, though. Auto and aerospace giant Daimler-Benz uses a multimedia system that allows designers in Sindelfingen, Germany, to work on plans for a new car with engineers in the United States and Japan.

In 1987 BASF, a large German chemical company, created an IT division out of a data processing department that once supported only corporate headquarters. Now BASF has expanded into Eastern Europe and the former Soviet Union and—despite formidable technological, cultural and regulatory hurdles—is building an integrated information technology system.

Elsewhere in Europe, France's Minitel system pioneered online mass marketing, and the French lead the world in the use of electronic cash cards. And Germany's SAP AG, the innovative software company that leads the market with mainframe-based and client/server applications software (with 1994 worldwide sales over $600 million), is setting a blistering pace for growth in Europe and the United States.

Clearly, Europe shouldn't be written off.

Meanwhile, back in the U.S., CIOs have the job of keeping their corporate computing resources up and running. In her article "Daring to Look Down," which starts on Page 48, Contributing Writer Mickey Williamson argues that CIOs have performed so well at delivering, maintaining and managing reliable systems that customers now expect near 'round-the-clock availability.

Unlike users, IS executives know that downtime is inevitable—and expensive. At Healthsource Inc., a medical claims processing company in Hooksett, N.H., system downtime of one day would cost the company between $250,000 and $500,000. Blue Cross & Blue Shield of Maine figured the financial consequence of a three-day computer failure would be $500,000.

With figures like this, preparing for the inevitable is crucial.

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CIO

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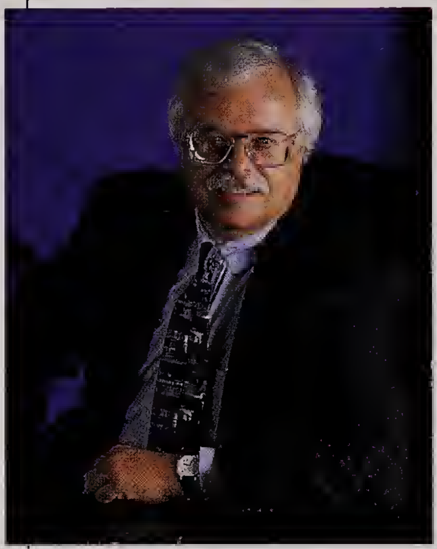

In the '60s it was mainframes. In the '70s it was minicomputers. In the '80s it was the desktop PC. But it's the '90s that will always be linked with the mainstream acceptance and usage of the Internet and the World Wide Web. And that phenomenon will change the course of business forever.

Just take a look at the Web's phenomenal growth in two short years. If you explored it in early 1993, you could have visited all the sites that were constructed—23—in a few hours. In 1994, it would have taken you much longer because that number had exploded to 3,000. But hold on to your hats: Forecasters predict that by the end of 1995, there will be more than 50,000 business-related Web sites.

This is certainly a technology you cannot ignore.

Although new "Internet" magazines seem to spring up every day, not one has addressed the needs of the business executive who wants to know how this hot new technology can enhance business value. Not until now, that is. Included with the next issue of *CIO* you will find our special supplement, *WebMaster*. Both *WebMaster* and its online counterpart will provide solutions-oriented information—case studies, business trends, legal issues and more—to help you understand the enterprisewide value inherent in the World Wide Web.

WebMaster will be published as a bimonthly supplement in 1995 (June/July, September/October, November/December) with the following mission:

- Empower senior management and webmasters in their quest to effectively exploit the Internet for business value and profit as we enter the commercial market phase;
- Propel the rate of adoption for the WWW infrastructure and the technologies required to conduct business successfully on the Internet;
- Close the gap between top executives who set technology IT standards and approve purchases and the webmasters who recommend and evaluate WWW product/service brands;
- Provide mission-critical information that will help executives make profitable decisions and smarter technology choices; and
- Fill the void with strategic "why to/how to" business information that the consumer-targeted, tactical Net/Web magazines fail to address.

Like the telephone, computer and fax, someday the World Wide Web will be used by all. But only those who view it as a competitive necessity today will come out on top tomorrow.

P.S. If there are individuals in your organization who would benefit from receiving *CIO* and its *WebMaster* supplement, please have them call Denise Perreault at 508 935-4443.

PHOTO BY WEBB CHAPPELL

Coming In CIO

Sweet Success

Back in 1989, Boston's Brigham and Women's Hospital was considering an enterprisewide migration to a 4,000-node client/server network. For all the hospital's decision makers knew, no one in health care or elsewhere had ever pulled off such a large-scale system. There was no one to compare notes with or derive comfort from. Today, the project has been successfully completed and has produced bottom-line paybacks. *CIO* looks at the plan, the migration and the results of the project, as well as what the future holds.

Signs of Support

Software support is changing. Vendors that used to offer free support are now charging for it as an add-on. Some vendors offer to support other vendors' software as well as their own. There is also a trend toward third-party software support, in which companies that don't make or even sell software are selling support services. *CIO* will take a look at the developments in this area and try to gauge how well they're working.

High Finance

The world of financial services lives and dies by its information, so it's not surprising that IT is everywhere. Managing risk on a global basis is one particularly critical imperative driving much technology implementation today, and the response often involves client/server-based systems that enable firms to create data warehouses and implement decision-support systems. We'll talk to companies in this industry to see what use they're making of IT.

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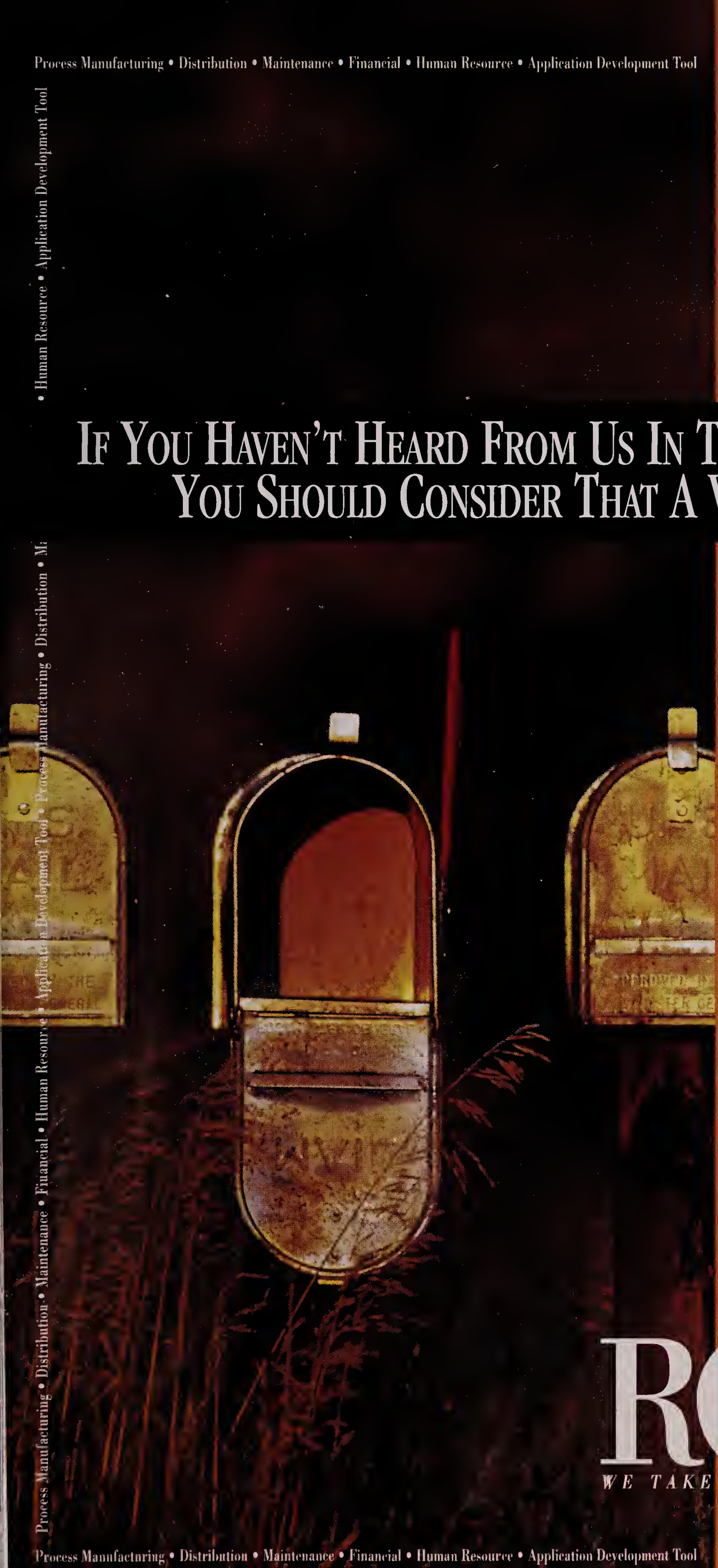
After all, it takes time to develop superior client/server solutions.

While other companies have rushed head-long to market with bits and pieces of "almost there" technology, Ross has quietly gone about the business of building a superior client/server architecture. And producing a full suite of robust open systems solutions that run on HP, Digital and IBM platforms, using popular databases like Oracle, Sybase, Rdb and Ingres.

IF YOU HAVEN'T HEARD FROM US IN THE LAST FEW MONTHS, YOU SHOULD CONSIDER THAT A VERY GOOD SIGN.



These carefully designed client/server systems offer one critical advantage:

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So find out the difference between software done fast and software done right. Call Ross at 1-404-851-1872, ext. 3400. Then watch your mailbox. We've been too busy to write...but you're going to hear from us now.

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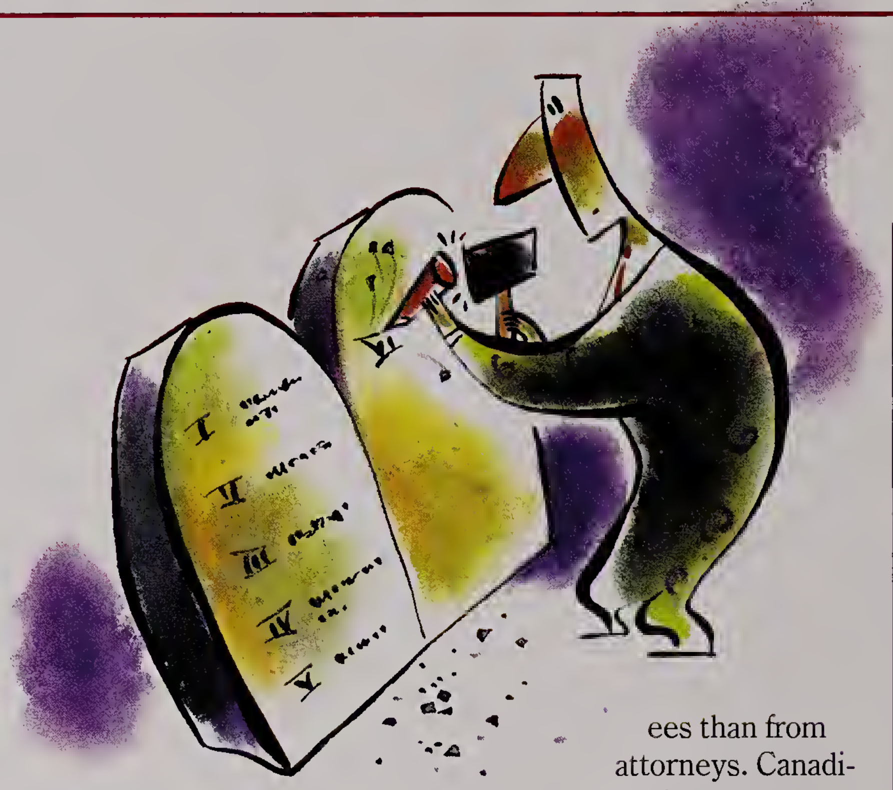


BUSINESS ETHICS

VALUES ADDED

To the cynical, "business ethics" may sound at best like an abstract B-school concept, or at worst like an oxymoron. But at a growing number of companies, ethics codes have become a way of life—every day, at every level.

More than 77 percent of major global corporations circulate values-based ethics codes to all employees, according to a survey of 264 companies by The Conference Board, a New York-based business organization. Executives expect workers to use those codes in making daily decisions reflecting company values.

That's a big change from a decade ago, says Ronald Berenbeim, The Conference Board's business ethics specialist. Then, research indicated companies with such codes were guilty of more ethical lapses than companies without formal guidelines. Today, he says, similar research would be impossible because there aren't enough major companies without ethics codes to make the comparison.

Codes vary widely among companies and industries. But, Berenbeim says, most seek to transform employees into "moral legislators." The documents set down a common set of corporate values but also give workers the freedom to interpret them independently—as long as their actions don't conflict with the company's overall philosophy.

Ethics codes also vary widely from one part of the world to another. American corporations view their codes as legally enforceable documents, with the majority including their lawyers in drafting the principles. In Europe, companies see codes as "social compacts" between management and workers; they're more likely to encourage input from employees than from attorneys. Canadian codes, meanwhile, usually reflect the consensus of the CEO and senior executives, rarely involving lawyers or workers.

Regardless of industry or location, corporate codes of ethics tend to:

- view people—employees, suppliers, customers—as the company's primary source of value;
- recognize responsibility and accountability as the foundations of corporate autonomy; and
- acknowledge that adhering to ethical principles could lead to economic losses. For instance, a company might have to sever ties with a valuable partner whose business practices in developing countries conflicted with corporate values.

Contemporary codes tend to serve more as credos about beliefs rather than rigid lists of do's and don'ts, Berenbeim says. "This can go over very poorly if it's distributed in a punitive or hierarchical way," he says. Success hinges on encouraging all employees to practice the values, with the company's executive team setting an example.

And the process of establishing ethics never ends. Fifty-nine percent of the companies surveyed by The Conference Board reported that they had replaced their ethics codes within the previous three years.

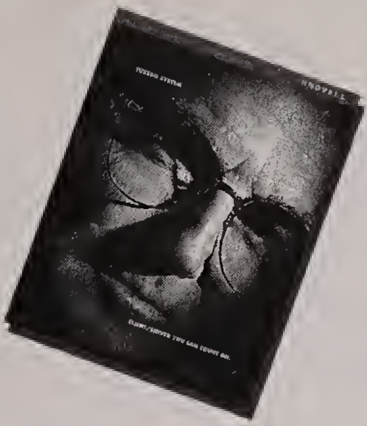
–Anne Stuart

COMING TO TERMS

If your company uses software, you know that negotiating for a license agreement your company can live with is critical. But when the proposed agreement contains terms and conditions you're not familiar with, that's not always easy. Fortunately, the Society for Information Management's IT Procurement Working Group is now offering a collection of nearly 80 electronic "index cards" that can help negotiators evaluate vendors' agreements or construct master agreements for their own companies. The card file defines in alphabetical order most terms and conditions found in mainframe and midrange software license agreements and presents the issues surrounding topics such as liability and warranties. In addition, it lists questions that should be asked under certain circumstances.

The Windows-based reference file is available from SIM for $75 for members or $200 for nonmembers. Call 312 644-6610.

ILLUSTRATION BY BETHANY GULLY



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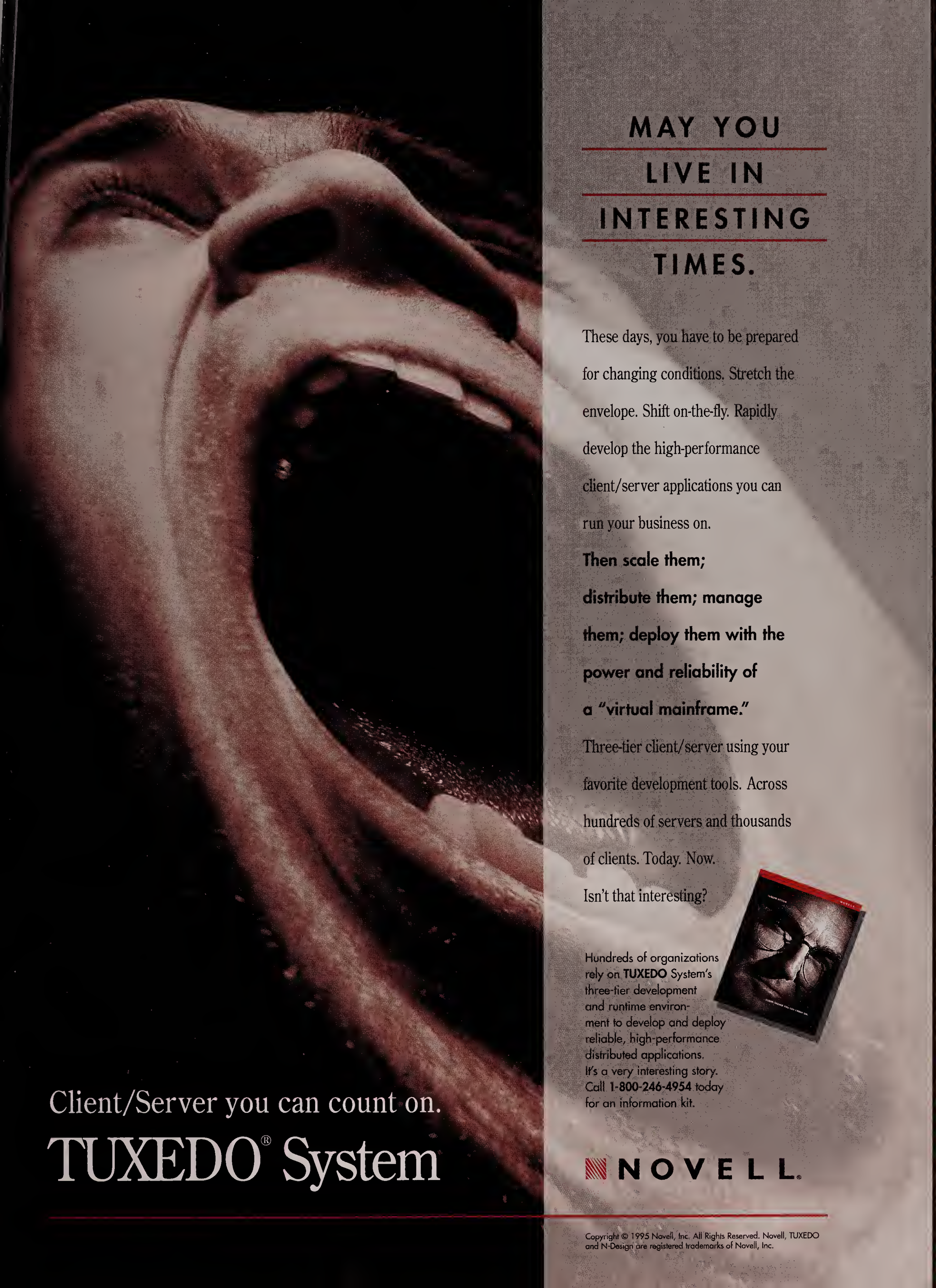

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TRENDLINES

FAX TECHNOLOGY

CRUISE CONTROL

Online communications can bring an organization great rewards, but not if those it needs to communicate with—its business partners, for example—are not hooked up themselves. Such was the case for Carnival Cruise Lines in Miami, which communicates regularly with the thousands of travel agents worldwide who book its cruises; many of those agents do not have electronic network connections.

Carnival had been using fax bureaus to send travel agents fax broadcasts of marketing information such as tour itineraries, wedding packages and on-shore excursions. But about a year ago, the firm decided that it made more fiscal sense to purchase a system that would enable it to handle the broadcasts—which can amount to 800,000 pages per month—itself. "There's about 45,000 travel agents we communicate with worldwide on a regular basis," says Doug Eney, Carnival's director of systems and technologies. "We were looking for a way to communicate with them rapidly and cost effectively."

The solution, deployed in 1994, was a dedicated, PC-based turnkey fax system including five Host-Fax Communications Servers from American International Facsimile Products (AIFP) of Beaverton, Ore., linked to Carnival's Unisys servers and PC networks. The five servers include software modules for capabilities such as fax-on-demand and remote dial-in; they handle both inbound and outbound faxing for Carnival and eliminate paper in both directions. The result: In addition to timelier communications, says Eney, "costs associated with marketing have gone way down, and we've improved our service to our customers."

Take the marketing broadcasts, for example. Instead of printing updates and sending them through the mail at an average cost of 26 cents per piece or outsourcing them to a fax bureau, Carnival is able to send updated information to all 45,000 agencies in a matter of hours at a cost of about 6 cents per fax. The marketing information is stored in Carnival's enterprise server, and the fax is automatically generated and sent by the AIFP system. "We have a lot more control over the broadcasts than before," says John Masseria, manager of systems support. "The overall quality of faxes is better because we use desktop publishing technology to create them."

The system is also used to send travel agents and passengers tour information and confirmations within seconds of their having made reservations, complete with airline arrangements, itemized billing and an itinerary schedule and map. Most passengers book cruises through travel agents months in advance, and they normally don't get their airline tickets and final documents until 30 days prior to departure. "We now have the ability to give passengers something they can take home with them right from the travel agency," says Masseria. Currently, Carnival receives approximately 3,000 requests for immediate confirmations from travel agents every day.

The fax servers have also come in handy when Carnival needs to modify a cruise package to use a different airline carrier or to upgrade a particular passenger to

THEY CALL 'EM AS THEY SEE 'EM

Purchasers of toasters, shampoos and compact-disc players have long been able to turn to *Consumer Reports* for advertisment-free buying advice. Today, organizations looking to choose business insurance, toner supplies, 800 phone service or just about anything else a company might need can find the same type of information in the *Business Consumer Guide*.

Published by Beacon Research Group, of Watertown, Mass., the *Business Consumer Guide* is a monthly publication established to evaluate products and services for the business community. Recent issues have reported on calling cards, ground shipping, fax servers, office furniture, software suites, office copiers and CD-ROM drives. A year's subscription costs $159; single reports are $25 each. Call 800 938-0088. ■

ILLUSTRATIONS TOP BY MICHAEL SIGGINS; ILLUSTRATION BOTTOM BY BETHANY GULLY

With the SAS® System, we can integrate large amounts of data and build a picture of how our fields are performing.

Why Chevron U.S.A. Production Company Relies on the SAS System

Chevron

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The Means to Make Better Decisions

Providing the means to deliver accurate and timely information to improve work processes and make better business decisions is the job of George Alameda, Chevron U.S.A. Production Company's Manager of Information Technology.

The company is using the SAS System to help with enterprise-wide information delivery. "Our mission is to make financial, operational, and reservoir data available in an easy-to-use format to all the asset teams at work in CUSA Production Co.," says Alameda. "We've found the SAS System is a superior solution for analyzing data, turning data into useful metrics, and guiding our cross-functional teams toward improved work processes."

One team, in CUSA Production's Western Business Unit, is tracking the profitability of individual wells. "It's a tremendously difficult task to optimize our field operations for maximum profitability," says Alameda. "With the SAS System, we can integrate large amounts of data and build a picture to compare one field against another and challenge our asset teams to identify and share best operating practices."

Reaching for the Best

Alameda looks forward to extending the use of the metrics and performance monitoring data to employees trying to improve their work processes. He admits his vision is far reaching, but so is the SAS System. "Our challenge is to be better than the best," he concludes, "and the SAS System is helping us reach that goal."

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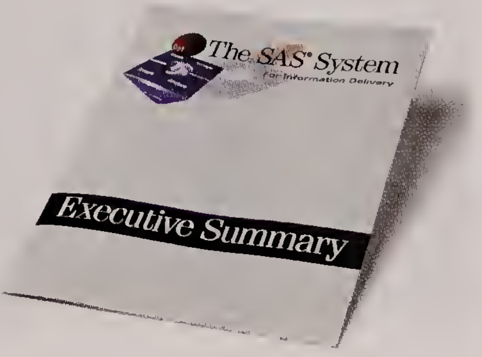

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first-class service, for example; updates for both agents and customers are sent to agents' fax machines. And all of Carnival's purchase orders for food and beverages are distributed to suppliers via the fax servers, eliminating the need for someone to spend a day feeding documents into a fax machine. All fax transmissions are stored in a centralized repository, giving Carnival the ability to track exactly where money is being spent.

In the future, Carnival plans to integrate inbound faxing with its internal e-mail system by providing each user with an individual ID number. Rather than being sent to standalone fax machines, incoming faxes will then be routed directly to a user's e-mail box, saving both time and money by allowing the fax machines and their dedicated phone lines to be eliminated.

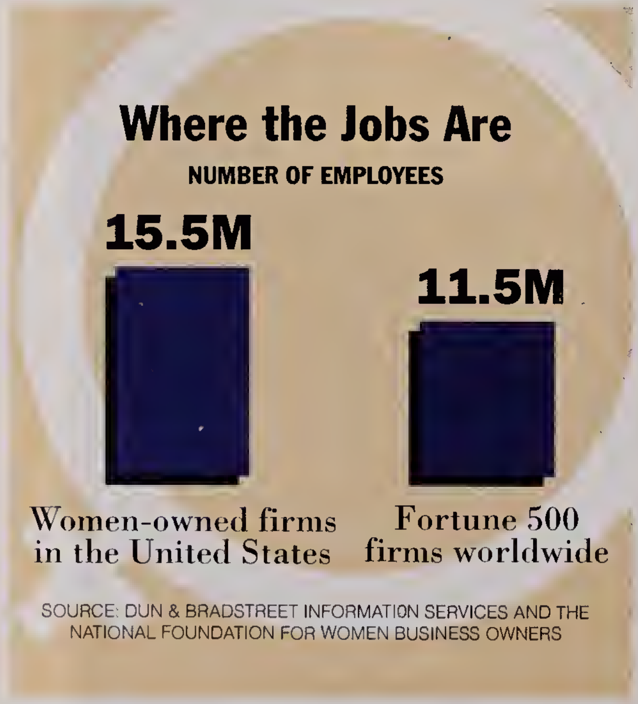
"With this technology," says Eney, "we are improving our own productivity and helping travel agents close a sale."

–Megan Santosus

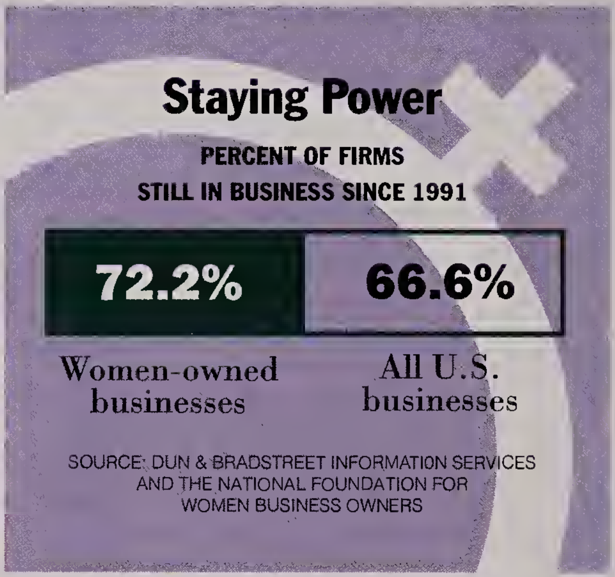
CHERCHEZ LA FEMME

Imagine how many people the Fortune 500 employ worldwide. No small sum, right? Now add 35 percent to that, and you've got the number of people employed by women-owned businesses in the United States alone. Numerous new statistics like that from a recent national study by The National Foundation for Women Business Owners (NFWBO) and Dun & Bradstreet Information Services show that women-owned businesses are a much stronger force in the United States than most people think.

Specifically, the study found that there are now 7.7 million businesses owned by women and that those organizations provide jobs for 15.5 milion people and generate nearly $1.4 trillion in sales. While past research has found that obtaining financing is one of the biggest difficulties female business owners face, according to the NFWBO, the new study found that women-owned businesses are one of the most rapidly expanding—and financially stable—sectors of the economy. In fact, they are more likely to have remained in business over the past three years than the average U.S. firm. In addition, employment at these organizations grew by 11.6 percent between 1991 and 1994, compared with only 5.3 percent at the average U.S. firm.



SOURCE: DUN & BRADSTREET INFORMATION SERVICES AND THE NATIONAL FOUNDATION FOR WOMEN BUSINESS OWNERS



SOURCE: DUN & BRADSTREET INFORMATION SERVICES AND THE NATIONAL FOUNDATION FOR WOMEN BUSINESS OWNERS

"Women-owned businesses are growing more rapidly than is the overall economy and are major contributors to the nation's economic health and competitiveness," says Laura Henderson, chair of the Silver Spring, Md.-based NFWBO and president and CEO of Prospect Associates, a health communications firm. The NFWBO is a nonprofit research and leadership development foundation whose mission is to support the growth of women business owners and their organizations through the gathering and sharing of knowledge. For more information, call 301 495-4975.

SAY IT AGAIN, SAM

The information superhighway is not just the global network that promises to transform the way we do business, it's also the object of enough media attention to make even the enthusiast's patience wear thin.

To be exact, the term "information superhighway" was used 4,024 times in newspaper, magazine and broadcast stories between January 1992 and April 1994, according to a report by the Freedom Forum cited in a recent issue of *Scientific American*. "Information highway," meanwhile, was used 2,673 times.

Not surprisingly, the subject received the majority of that attention in later months. There were eight stories on the topic in January-February 1992; in the same period in 1994, there were 2,816.

CHARTS BY MICHAEL SIGGINS

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TRENDLINES

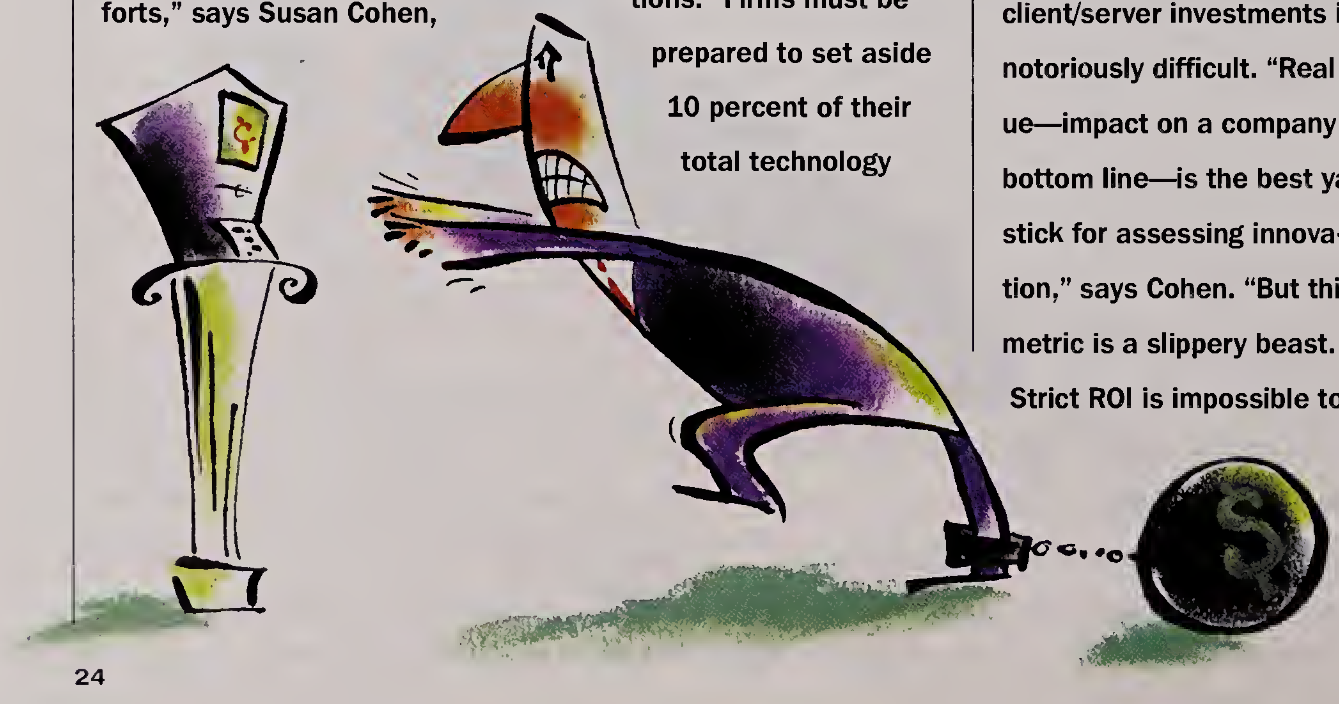
THE RETURN TICKET

Companies investing big bucks in client/server generally expect big returns. According to a recent study by Forrester Research Inc., the key to achieving that payback is to change business processes that stifle creativity.

Three processes stand in the way of maximum returns on client/server investments: annual business planning that includes technology merely as an afterthought, technology budgeting that buries infrastructure spending in new development efforts and corporate metrics that measure the return on technology in a vacuum, without recognizing the value of experimentation.

"Companies are spending, and will continue to spend, a fortune on dispersed systems to support reengineering and other business change efforts," says Susan Cohen, senior analyst of computing strategy research at the Cambridge, Mass., market researcher. "Unfortunately, most firms will not realize big returns from this technology spending. The problem is that most companies forget to change corporate planning processes that cast executives' feet in concrete."

Client/server systems provide the means to adapt to rapidly changing business conditions, "but only if business and IT executives resist the temptation to blindly automate existing operations," Cohen says. To unleash business creativity, senior executives must leverage their client/server backbone and demand business-unit-level experiments in three areas: creating novel new products, setting unprecedented levels of customer service and squeezing costs out of operations. "Firms must be prepared to set aside 10 percent of their total technology budgets to fund line-of-business experiments," says Cohen.



Pinpointing the return on client/server investments is notoriously difficult. "Real value—impact on a company's bottom line—is the best yardstick for assessing innovation," says Cohen. "But this metric is a slippery beast. Strict ROI is impossible to calculate for technology—it is not a discrete wealth enabler." Instead, Forrester recommends that companies use partnership scorecards built around discrete business goals to assess the business value of dispersed systems. For example, executives would assess the value of systems based on their contribution to reducing cycle time by 50 percent or improving product quality to less than one defect in 100,000 parts.

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Tutorials, open forums, roundtables and training sessions at this conference will cover a broad range of topics concerning database marketing. Issues discussed will include basic and advanced techniques of marketing, why databases fail and industry-specific tips. Registration: $1,195

ILLUSTRATION BY BETHANY GULLY

SynOptics & Wellfleet

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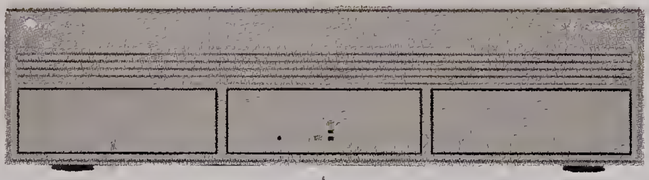

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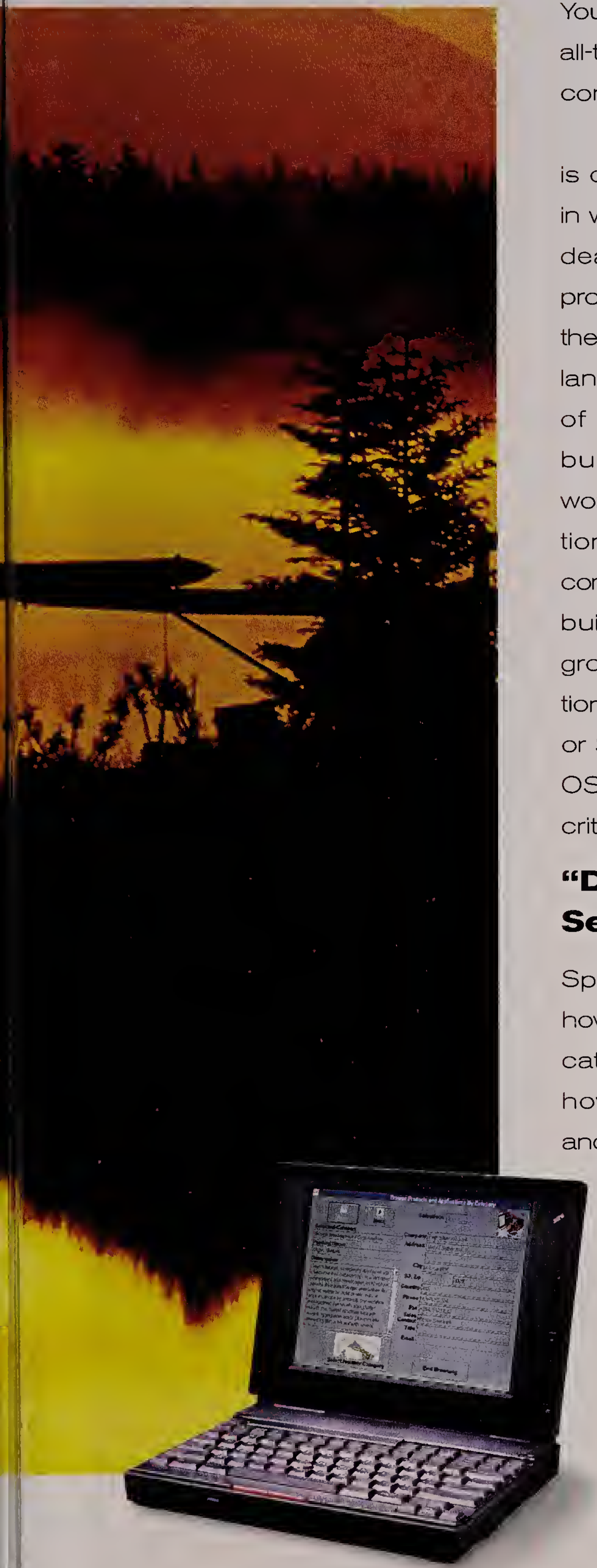

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E-Mail Bonding

Electronic mailing lists are a way for groups of people with common interests to meet and hold discussions in cyberspace. By helping IS executives worldwide find each other electronically, these lists can be a valuable tool for professional networking and communication.

BY DENNIS W. VIEHLAND

Few CIOs would dispute the importance of communication, whether between an organization and its customers or among professionals in the same field. But while the increasing value of IT in supporting the former type of communication has been generally well-publicized, technology's potential for facilitating professional communication is less widely known. Professional associations, conferences and industry events are all important networking vehicles, but a simple tool on the Internet can help IS professionals find each other electronically to discuss common concerns.

By any measure, electronic mail is the most common form of computer-mediated communication used today. It is the first such application most people learn and generally remains the one they use most frequently. But e-mail is limited by the one-to-one nature of the communication; it works best for conversations between just two people. While electronic messages can be broadcast to a small group, as in an office or a project team, it can be difficult to link to people outside the business and to keep a group e-mail address list up-to-date. So, although a valuable tool for one-to-one or one-to-few communication, electronic mail is not structured for collaborative discussions.

ILLUSTRATION BY GREG COUCH

For users who wish to find and "talk" with others who have similar interests, a range of electronic discussion groups has emerged as part of the Internet. These groups help facilitate professional communication by enabling one-to-many communication on a global basis.

Netizens interested in participating in group discussions on the Internet have two options: Usenet and electronic mailing lists. Usenet, a global electronic bulletin board, is a valuable resource for technical discussions and informal chatting. However, you must have access to a Usenet server and a newsreader client, as well as the time and inclination to navigate the system. For many, e-mail lists are the group-discussion tool of choice.

In an electronic mailing list, an ever-changing list of e-mail addresses is maintained by mailing-list software on some Internet-connected computer. Mail sent to the list's electronic address is automatically distributed to all list members, so subscribers can use it to converse electronically with a group of people interested in the same subject. The original e-mail list software was Listserver, commonly known as LISTSERV. Recently, alternatives have emerged such as ListProcessor, Mailserver and Majordomo.

One reason these lists are so popular is that they are an extension of

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electronic mail. The novice or occasional computer user who knows how to use e-mail and can access the Internet can, with one simple message, participate in an ongoing electronic discussion group. Another reason is the delivery mechanism. A subscription to an electronic mailing list means messages are delivered directly to your desktop. Finally, consider the nature of traditional message systems: Letters in your mailbox receive more attention—and you check for them more regularly—than notices posted on public bulletin boards. The comparison applies to electronic messaging systems as well.

Numerous discussion "threads" may develop, leading to an atmosphere comparable to a cocktail party in which several conversations are taking place at the same time.

Conversations on an electronic mailing list can be as different as conversations in the nonvirtual world. Lists differ in message volume, formality and the degree to which the discussion sticks to the topic. Numerous discussion "threads" may develop, leading to an atmosphere comparable to a cocktail party in which several conversations are taking place at the same time.

Most e-mail list discussions are unmoderated forums in which a message sent to the list address is immediately sent to all list members. An occasional problem with these lists, however, is that participants can post irrelevant, erroneous or inappropriate messages. For this reason, many e-mail lists are moderated—messages are sent to someone acting as a list moderator, who returns "junk mail" to the sender and passes on appropriate messages without com-

Directory Assistance

There are electronic mailing lists devoted to virtually every topic imaginable. The following are groups of particular interest to IS executives.

- **AACCSYS-L:** Accounting Information Systems *listproc@scu.edu.au*
- **AINTSYS-L:** Intelligent Systems (AI/ES) for Accounting *listproc@scu.edu.au*
- **BPR-L:** Business Process Redesign *listserv@is.twi.tudelft.nl*
- **CASE-L:** Computer-Aided Software Engineering *listserv@uccvma.ucop.edu*
- **CIS-L:** Careers in Information Systems contact *earvaben@ube.ubalt.edu*
- **DASIG:** Data Administration Special Interest Group *listserv@suvm.bitnet*
- **EDI-L:** Electronic Data Interchange Issues *listserv@uccvma.ucop.edu*
- **EIS:** Executive Information Systems *mailserv@cause.colorado.edu*
- **ETHICS-L:** Discussion of Ethics in Computing *listserv@uga.cc.uga.edu*
- **GIS-L:** Geographic Information Systems *listserv@ubvm.cc.buffalo.edu*
- **GSS-L:** Group Support Systems *listserv@uga.cc.uga.edu*
- **IDSS:** Intelligent Decision Support Systems *listproc@socs.uts.edu.au*
- **INFOSYS:** The Electronic Newsletter for Information Systems *listserv@american.edu*
- **ISWORLD:** Information Systems World Network *listserv@irlearn.ucd.ie*
- **OCISNET:** Organizational Communication and IS contact *mark_fuller@baylor.edu*
- **OSRA-L:** Office Systems Research Association *listserv@vtvm1.cc.vt.edu*

- **SIS:**
  Strategic
  Information Systems
  mailbase@mailbase.ac.uk
- **SYSTERS:**
  Computing Women's
  Discussion Group
  systers-request@pa.dec.com

Source: Information Systems Resources on the Net (ISRN) by Dennis W. Viehland. For more information about ISRN, send this e-mail message to listserv@american.edu: *get isrn readme. Or, go to ISWorld Net's home page on the World Wide Web:* http://www.cox.smu.edu/mis/iswnet/home.html *(in InfoSys Junction).*

Signing Up

To join an IS list, send the following one-line e-mail message to the subscription address given—subscribe (listname) (your firstname lastname)—taking care to make the appropriate substitutions. For example, to subscribe to INFOSYS, I would send this message to *listserv@american.edu*: subscribe infosys Dennis Viehland. To take your name off a mailing list, you generally send this two-word message to the same address: unsubscribe (listname). Additional information about these e-mail lists, a complete directory of IS lists and a guide to e-mail list participation is available electronically from the ISRN guide at the locations noted.

–D.W. Viehland

ment or significant delay. Electronic newsletters, meanwhile, represent the highest degree of editorial control. They have the most "reader-friendly" format because all messages are tightly screened for distribution, presented in standard formats and assembled in a meaningful order, with features such as a table of contents. Virtually all mailing lists are free, but a few electronic newsletters charge a subscription fee.

There are thousands, perhaps tens of thousands, of Internet-accessible e-mail lists. The trick is finding the ones of interest to you. Directories, or "lists of lists," are available in electronic and paper-based form, but most Internet users can find e-mail lists in subject-oriented electronic guides such as Management Archive, ANet for accountants and Information Systems Resources on the Net (ISRN). (ISRN is a guide I am developing to catalog electronic mailing lists, electronic publications, newsgroups, gopher sites, World Wide Web servers and other Internet resources that are of interest to IS professionals. For more information about it, see the source note in the listing at left.)

In developing ISRN, I recently conducted a review of Internet electronic discussion groups and found 34 e-mail lists related to information systems. A number of these lists have an academic focus (for example, Cross Cultural Research in Information Systems or Datacoms and Telecoms Teaching) or are sponsored by an IS association (e.g., the Data Processing Management Association list). Based on a somewhat subjective evaluation, I have identified 18 lists that would be of most interest to IS executives. Those lists, each with a subscription address for joining, are shown in the box at the left. (The complete list of 34 lists along with additional information is available by following the instructions in the ISRN readme file described in the source note.)

Most IS e-mail lists have a relatively narrow focus or target audience. The two exceptions are INFOSYS and ISWORLD—both serve the broad, global interests of the IS community on the Internet, but also still retain a large academic audience. The principal difference between the two is their format: INFOSYS is an electronic newsletter, whereas ISWORLD is an unmoderated forum. The largest IS lists (but not necessarily the most active) are INFOSYS (3,500 members), ISWORLD (1,300 members) and GIS (1,200 members).

The increasing presence of commercial organizations on the Internet means that many lists are evolving into forums that include a great deal of business-oriented discussion.

How do these lists facilitate professional communication? Announcements of all sorts—conferences, products, vacant positions, new publications—dominate some, such as ISWORLD and OCISNET. Other lists are principally for asking questions and discussing problems in genuine conversation; examples include CASE and EDI. Most discussion groups were started by academics, but the increasing presence of commercial organizations on the Internet means that many lists are evolving into forums that include a great deal of business-oriented discussion.

E-mail lists have much to offer IS executives. The next step is up to you: Join a group and start tapping into the wealth of electronic discussion all around you. CIO

Dennis W. Viehland is a senior lecturer in information systems at Massey University in Auckland, New Zealand, and editor of the INFOSYS electronic newsletter. He can be reached via e-mail at d.viehland@massey.ac.nz. *His home page on the World Wide Web is* http://smis-www.massey.ac.nz/personal/dviehlan/dennis.html.

Beyond Borders

International boundaries don't necessarily demark differences in consumer tastes. Nor should they dictate how you run your company—or your IS organization.

BY DONALD A. MARCHAND

In the mid-1980s, large Japanese manufacturers like Sony Corp. and Matsushita Electronic Corp. began developing regional value chains throughout Asia and Europe. At the time, creating a seamless pipeline that linked customers, manufacturers and suppliers from all parts of a continent was a relatively novel concept, especially in pre-unified Europe. Back then, most global companies with significant European stakes still adhered to the traditional model of maintaining separate manufacturing, distribution, and sales and marketing operations for each country.

Sony was among the first to address the economic reality just then coming to the fore in Europe: namely, that diverse consumer tastes—not international borders—should dictate how companies are organized. A pan-European model in which companies centralize manufacturing facilities to serve regional and local sales and marketing outposts is the new standard taking hold across the continent.

As trade barriers have gone the way of the Berlin Wall, many multinational companies are reorganizing their value chains to reflect a newly integrated Europe. They have become pan-European to achieve economies of scale while adding value and improving customer service. They also have decreased the total number of suppliers and focused on strengthening relationships with a few key regional suppliers to cut lead time and enhance quality control.

As multinational companies establish market segments that transcend borders, they discover, for example, that aiming products at German-speaking consumers in Germany, Austria and Switzerland is very different from marketing to these countries individually. Successful regionalization of operations around consumer needs depends on effective information management and a sound IT infrastructure. As a result, CIOs at these pan-European organizations now occupy extremely strategic positions.

ILLUSTRATION BY MIN JAE HONG

The implications of this new environment dominated much of the discussion at a forum held at the International Institute for Management Development in Lausanne, Switzerland, in October of 1994. The 21 IS executives in attendance represented 13 global manufacturing companies that had taken a cue from their Japanese predecessors; each was in the midst of integrating all of its separate, country-specific customer-service, supplier-relations, distribution, manufacturing and product-design operations into a single, pan-European value chain. Where best to deploy information resources throughout the new value chain to achieve competitive advantage ranked high on their agenda.

To support a market-driven focus, the IS executives reported that their departments are adopting a dual centralized/decentralized or "federated"

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Application Form

Enterprise Value Awards For 1995

Honoring executives who craft innovative information technology solutions to enhance business value

Sponsored by CIO Communications Inc.

APPLICATION DEADLINE: JULY 1, 1995

The Enterprise Value Awards℠

Honoring executives who craft
innovative information technology solutions
to enhance business value

SPONSORED BY

CIO

CRITERIA

Winners will be chosen by a panel of independent judges from among entrants who have submitted completed application forms to CIO by July 1, 1995. Entries will be judged on the following criteria:

- The extent to which the system adds business value in furthering the organization's strategic objectives
- The measurable financial return the system provides to the organization
- The extent to which IT was key to achieving the overall business solution—the "couldn't have done it without technology" factor
- The quality of collaboration between the business unit and IS organization that is achieved throughout the course of the project

All finalists will be subject to an in-depth analysis of the nominated system (to be performed by CIO or its agents). This analysis, which may require a site visit, will be based on interviews with sponsoring executives and system users, and will be designed to substantiate all claimed benefits. Notification of winners will occur on or about Oct. 16, 1995. CIO reserves the right to publish relevant cost and savings figures that establish the claimed ROI of the system; *the willingness to divulge this information for publication is a condition of entry.*

DEFINING VALUE

We invite applicants to consider the broadest possible spectrum of enterprise value. The following list of IT-enabled benefits is intended to help guide applicants' thinking:

- new, innovative and more productive ways of doing business;
- revamped organizational structures or styles of performing the work of the enterprise;
- the ability of the enterprise to enter a new market;
- successful global operation or expansion;
- transformation of the way the enterprise competes within its customary market or that alter the terms of competition within the market;
- improvement of the enterprise's relationships with its external customers;
- improvement of the enterprise's relationships with its own employees or among its functions (such as marketing, finance or human resources);
- the ability of the enterprise to compete more effectively by adding to the sum of its available knowledge assets;
- leaner and more economical operations.

ENTRY GUIDELINES

- The system must have been operational prior to July 1, 1993.
- Entrants must agree to be featured, along with their system and organization, in a *CIO* article.
- Entries must be complete.
- Entries must be on 8.5x11-inch paper, one side per sheet.
- The application form may be reproduced.
- Multiple entries from one company will be considered, but each entry must be submitted separately.
- Entries must be made jointly by the IS executive AND the business sponsor for whom the system delivers value.
- IT vendors, public-relations and advertising firms, consultants and other third parties may NOT apply on behalf of another firm. They are encouraged to forward this form to the "owner" of the system, or to contact CIO Communications to recommend that an application form be sent to their client.
- All entries must be computer-generated or typed; no handwritten entries will be accepted.
- When feasible, an additional copy of the entry should be sent on a 3½ -inch disk. Electronic entries must be limited to word-processing and spreadsheet packages that are compatible with Microsoft Word and Microsoft Excel on an IBM or Macintosh platform.

1. COMPANY/BUSINESS UNIT

▲ NAME OF PARENT COMPANY

CITY, STATE WHERE HEADQUARTERED

PUBLICLY HELD? PRIVATELY HELD?

ANNUAL REVENUES

INDUSTRY

NAME OF BUSINESS UNIT OR ORGANIZATION

CITY, STATE WHERE LOCATED

NUMBER OF EMPLOYEES AT BUSINESS UNIT

2. ENTRANTS

A.

▲ NAME OF ENTERING I.S. EXECUTIVE

TITLE

NAME OF DIVISION, DEPARTMENT OR UNIT

ADDRESS

CITY

STATE ZIP

( ) ( )
TELEPHONE FAX

B.

▲ NAME OF ENTERING BUSINESS-UNIT EXECUTIVE

TITLE

NAME OF DIVISION, DEPARTMENT OR UNIT

ADDRESS

CITY

STATE ZIP

( ) ( )
TELEPHONE FAX

3. SUPPORTERS

Please list four people who are willing to be interviewed with regard to the system, its development, its use and the value returned. At least one should be a member of the technology team that developed the system and should have played a significant role. At least one should be a primary user from the sponsoring business unit. The other two may be from either organization or represent suppliers, customers or others intimately familiar with the system.

A.

▲ NAME

TITLE

( ) ( )
TELEPHONE FAX

REASON FOR INCLUSION

B.

▲ NAME

TITLE

( ) ( )
TELEPHONE FAX

REASON FOR INCLUSION

C.

▲ NAME

TITLE

( ) ( )
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REASON FOR INCLUSION

D.

▲ NAME

TITLE

( ) ( )
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REASON FOR INCLUSION

DEADLINE:
JULY 1, 1995

MAIL TO:

ENTERPRISE VALUE AWARDS
CIO COMMUNICATIONS INC.
492 OLD CONNECTICUT PATH
PO BOX 9208
FRAMINGHAM, MA 01701-9208

4. THE NOMINATED ORGANIZATION

Please tell us about your organization (company, business unit, agency) in 500 words or less. Include information on:

- when the organization was founded;
- mission statement;
- major products and services;
- markets served;
- any other data you believe to be relevant in terms of general background.

5. THE NOMINATED SYSTEM

Tell us about the nominated system and demonstrate its importance to the organization by completing the following sections. Please limit your material to five pages.

- **OBJECTIVE:** Identify the primary business objectives of the IT investment.

- **SCOPE AND IMPACT:** Identify the functions (e.g., customer service, manufacturing, planning) that were changed by the system, the nature of those changes and their impact on the business. Identify other business-change initiatives tied to the IT investment.

- **ADDED BUSINESS VALUE:** Describe how the technology investment is furthering the organization's strategic objectives, including any new business initiatives. Note any significant event that would help us evaluate the nominated system's value. Examples might include a merger, a new distribution channel or a significant regulatory change.

- **THE IMPORTANCE OF IT:** Identify the different components of the overall business change (e.g., business reengineering, downsizing, cycle times). Explain the importance of the IT component to the overall business change. Could the results have been achieved without IT?

- **COLLABORATION:** Describe how the business unit and IS organization worked together throughout the project—from concept to implementation. What were the specific tasks fulfilled by the business unit? IS organization?

6. QUANTIFYING ROI

Please provide a detailed summary of the nominated system's investment costs (including all up-front development expenses and annual maintenance charges) and its ROI to date. Include reasonable estimates of indirect and /or "soft" benefits.

7. TECHNICAL PROFILE

Briefly describe the technology of the nominated system. Please include the names of major vendors and products. If you prefer, you may attach a document containing a technical description of the system, providing it is no more than five pages.

NOTE: The examples provided here are meant to be illustrative, not all-inclusive:

- Architecture (e.g., client/server, distributed, mainframe)
- Hardware (e.g., mainframe/parallel processor, minicomputer/server, desktop computers, handheld/portable devices)
- Software (e.g., operating systems, database system, shells, application software)
- Software development tools (e.g., CASE, 4GLs, GUI developers, object-oriented development tools)
- Networking/communications hardware, software and services (e.g., modems, routers, electronic-mail packages, carriers and public networks)

8. TRUTH OF INFORMATION/RELEASE

The following release must be signed by both nominating executives if the application is to be considered. *Unsigned releases will invalidate the entry.*

I HEREBY STATE that the information provided is true and complete to the best of my knowledge and belief.

I AUTHORIZE the release and use of, in connection with the Enterprise Value Awards program, any and all materials furnished by me or others at the company contacted for this judging. I understand that information submitted on this application or subsequently gathered during the evaluation and judging process may be used in articles or any other type of publicity relating to the Enterprise Value Awards program.

I ALSO AUTHORIZE the release and use of my name, my company's name and my likeness, including but not limited to any photographs and any recording of my voice or image that may be taken of me for *CIO* Magazine. I agree that no compensation shall be due me or my company for such usage.

I RECOGNIZE that failure to meet these conditions or to provide sufficient material that can be published can cause the application to be rejected at any point in the process at the sole discretion of the sponsors.

1. ______________________________

▲ SIGNATURE OF NOMINATING I.S. EXECUTIVE

____

DATE

2. ______________________________

▲ SIGNATURE OF NOMINATING BUSINESS EXECUTIVE

____

DATE

9. OTHER EDITORIAL OPPORTUNITIES

If you are not selected as an award recipient, are you willing to be contacted for inclusion in other articles in *CIO* Magazine? **YES** ☐ **NO** ☐

How did you learn about the Enterprise Value Awards program?

☐ *CIO* MAGAZINE
☐ CONSULTANT
☐ SYSTEMS INTEGRATOR
☐ PR AGENCY
☐ ADVERTISING AGENCY
☐ ACADEMICIAN
☐ IS STAFF MEMBER
☐ OTHER PUBLICATIONS
☐ VENDOR
☐ OTHER (PLEASE IDENTIFY) ______________

CHECKLIST

HAVE YOU FILLED OUT...?

☐ Company/Business-Unit, Entrants and Supporters Information

HAVE YOU INCLUDED ON SEPARATE PAGES...?

☐ Nominated Organization
☐ Nominated System
☐ Technical Profile
☐ Additional Return on Investment Material

HAVE BOTH ENTRANTS SIGNED AND DATED...?

☐ Truth of Information/Release

HAVE YOU CHECKED OFF...?

☐ Other Editorial Opportunities
☐ How you learned about the Enterprise Value Awards program?

Finally, an award for information technology that recognizes people and their organizations.

MOST AWARD PROGRAMS recognize "Best Product" or "Most Innovative System." How about rewarding the strategists who take those products or systems and make them work to their best potential? They really deserve the credit.

As an IT or business executive who has built or utilized an information technology system that delivers both demonstrable ROI and strategic value to your organization, you deserve recognition and praise. CIO has created the Enterprise Value Awards to honor the architects of innovative IT solutions and in doing so, hopes to inspire others in their search for enterprise value.

ENTERPRISE VALUE AWARDS TIMELINE

APPLICATION DEADLINE: July 1, 1995

JUDGES SELECT WINNERS: October 1995

ANNOUNCEMENT OF WINNERS: October 16, 1995

AWARDS CEREMONY: February 6, 1996 at the *CIO* Enterprise Value Summit

DO YOU QUALIFY FOR AN ENTERPRISE VALUE AWARD? THREE CRITERIA ARE ESSENTIAL...

1. The pervasiveness of information technology —in other words, the strategic objective could not have been met without IT's contribution
2. A return of value to the enterprise (see Defining Value within this application form)
3. A partnership between an IT and business executive

If your innovative solution meets the above criteria, please fill out this Enterprise Value Awards application form. The February 1, 1996 issue of *CIO* will feature profiles of the winning organizations and the executives who have proven their strategic technology investments have had a positive and sustained impact on enterprise value.

On February 6, 1996 CIO will host a special awards ceremony honoring the winners at the annual *CIO* Enterprise Value Summit. If you would like to learn more about the *CIO* Enterprise Value Awards program, please call Tracey Grogan at (508) 935-4449.

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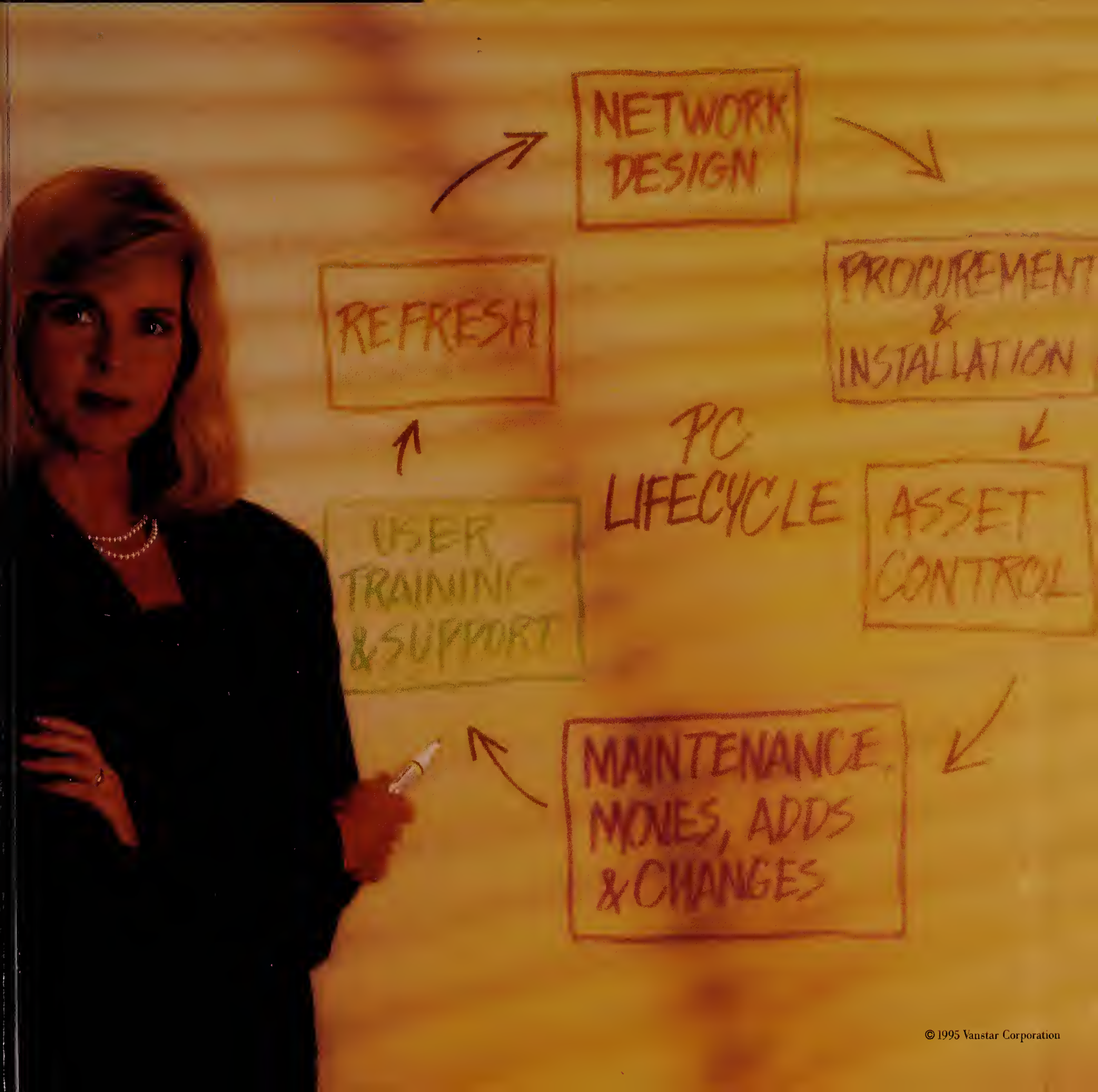

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approach to systems development and management. In some situations, a centralized IT solution is necessary to maintain consistency and control. Certainly, centralized manufacturing and distribution facilities should be supported by standardized systems and applications. On the other hand, sales and marketing often require flexible systems tailored to the unique markets they serve. Standardized applications may end up hindering the ability of regional and local offices to keep in touch with consumer needs.

It's up to the CIOs at pan-European companies to figure out which parts of the IT infrastructure should be managed from the corporate center and which need to be distributed regionally or locally. In other words, information executives must play a key role in restructuring the value chain. As if this task alone isn't difficult enough, in many cases CIOs also must navigate the often-treacherous waters of a migration to client/server technology at the same time. Consequently, they must support business-process changes that create value in the pan-European market even as they rethink the way technology is deployed. Needless to say, being a CIO at a pan-European company is one of the toughest jobs around.

The IS executives meeting in Lausanne agreed that flexibility, quality, low cost and speed of deployment are the most important operational imperatives to which they must respond. Choosing between centralized and decentralized infrastructures is not an option; the challenge for CIOs lies in striking the appropriate balance between the two to meet the needs of the corporation as a whole without compromising regional and local responsiveness.

In a consumer-focused environment, the need for accurate information about everything from production and manufacturing to inventory control and sales forecasting is more important than ever before. Product lead times are much shorter, which means that the old way of guesstimating consumer demand early in the production process and making iterations along the way is no longer adequate.

To support a market-driven focus, CIOs at pan-European corporations are adopting a "federated" approach to IS.

Consider the television market and the situation faced by Sony. In Scandinavia, consumers like sets with basic black cases. Southern Europeans prefer versions with brightly colored cases and higher-resolution screens. In both instances, consumer tastes play a critical role in determining what manufacturing produces; in any given year, information about consumer preferences translates into perhaps as many as 200 design changes. Local and regional sales and marketing offices need information systems that can collect and manage consumer and demographic data. An infrastructure linking the centralized design and manufacturing facility with sales offices makes it possible to feed critical data back into the corporate systems. For Sony, information management is driven by consumer rather than manufacturing requirements alone.

In 1990, Swiss packaged foods giant Nestlé S.A. announced efforts to transform its approach to manufacturing, distribution and marketing operations worldwide. With business spanning more than 160 countries, redefining the focus of the company was a major undertaking. In the process of rethinking its strategy, the company moved from a very decentralized to a more regionalized orientation for all functions except profit and loss and brand management.

Nestlé's corporate center began taking a more proactive role in developing policy and technical standards for the overall IS infrastructure in order to increase synergy among what had been very autonomous, country-based IS organizations. While market-specific databases are still managed and maintained locally, the scope of the company's operations and the need to ensure overall control led Nestlé to move toward standardizing mission-critical applications, such as telecommunications, e-mail and key financial- and inventory-management systems. For example, although the company had 135 different general-ledger systems in 1988, it has just 50 today. By 2000, Nestlé hopes to decrease that number to 15.

When evaluating functions in a federated approach, CIOs should avoid telling people in departments what to do. It's best to come at it from the opposite angle by telling people what they can't do. So let a local sales office use FileMaker Pro or whatever else it wants for maintaining customer lists. But make sure it doesn't use anything but Excel to upload sales figures back to headquarters.

CIOs must also take cultural differences into consideration. Several executives in Lausanne pointed out the ethical and legal issues of using consumer information in Europe. As a rule, Europeans have a much more conservative attitude toward consumer data than Americans do. As a result, personal information—especially anything of a financial nature—is generally not available for mass-marketing purposes. It's not a great idea to compile profiles of individual consumers in every market. Laws aside, marketers and marketing information systems must be attuned to local attitudes.

Finally, redesigning the value chain involves more than just changing the IS infrastructure. The push to become more sensitive to customers than borders requires a shift in attitude among the people working in IS. And changing culture is an ongoing process that can take anywhere from three to 10 years. In order to be successful, CIOs must look beyond short-term results. The ability to create value while lowering costs is a long-term goal.

Donald A. Marchand is professor of information management and strategy at the International Institute for Management Development in Lausanne, Switzerland.

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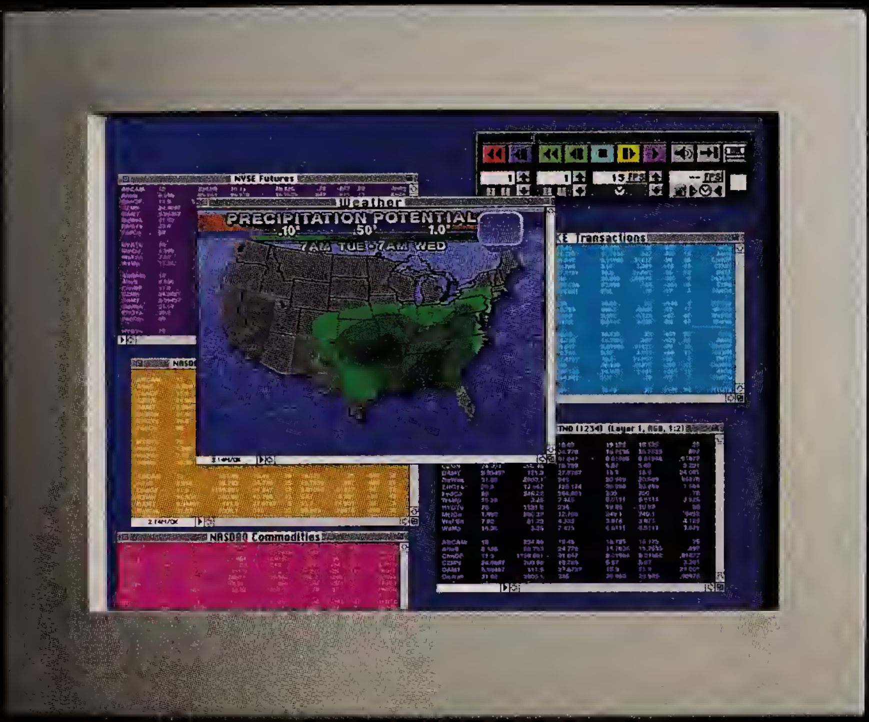

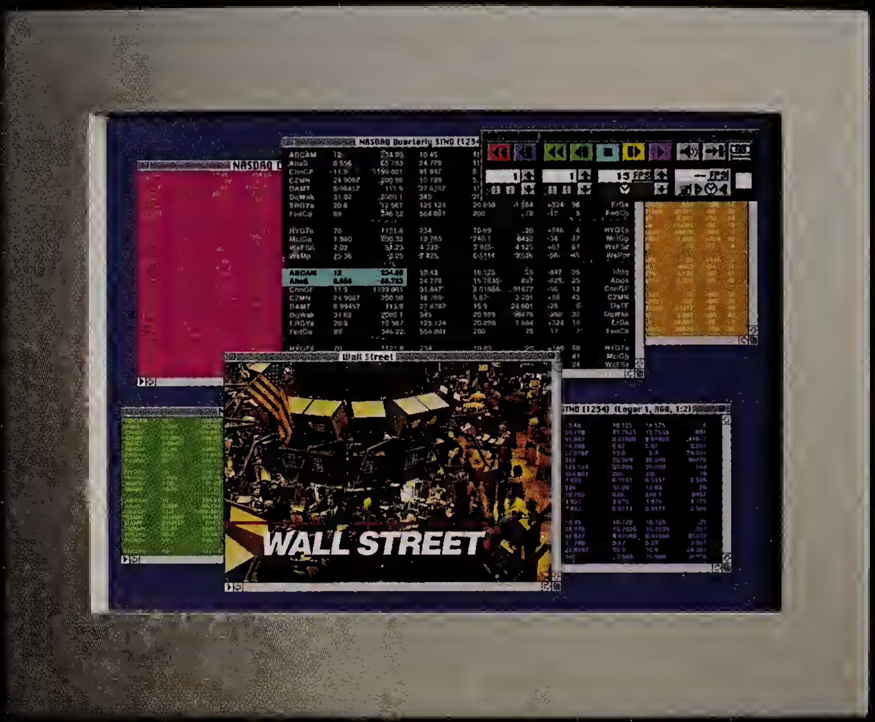

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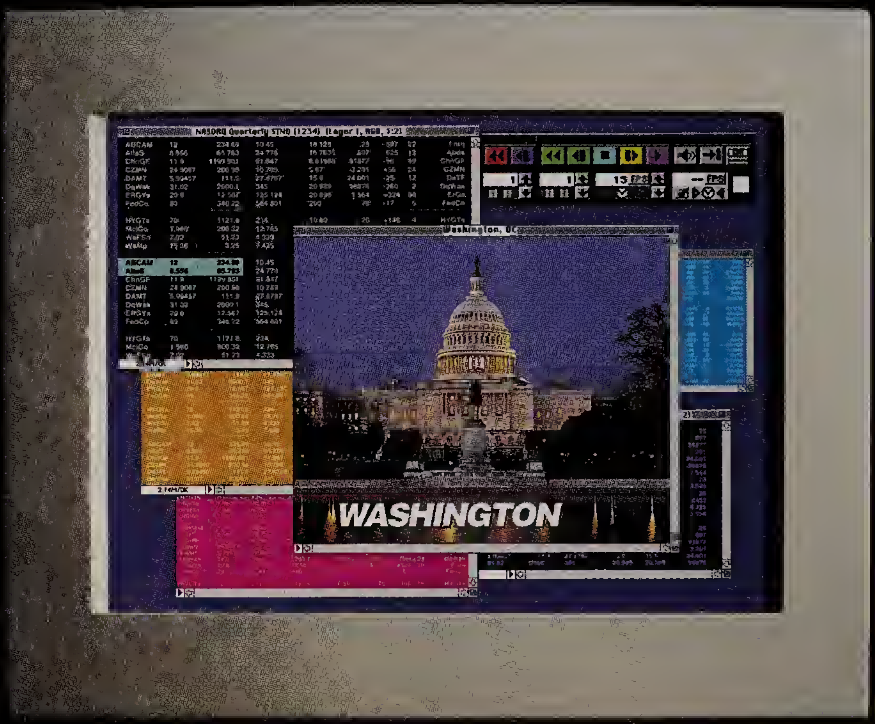

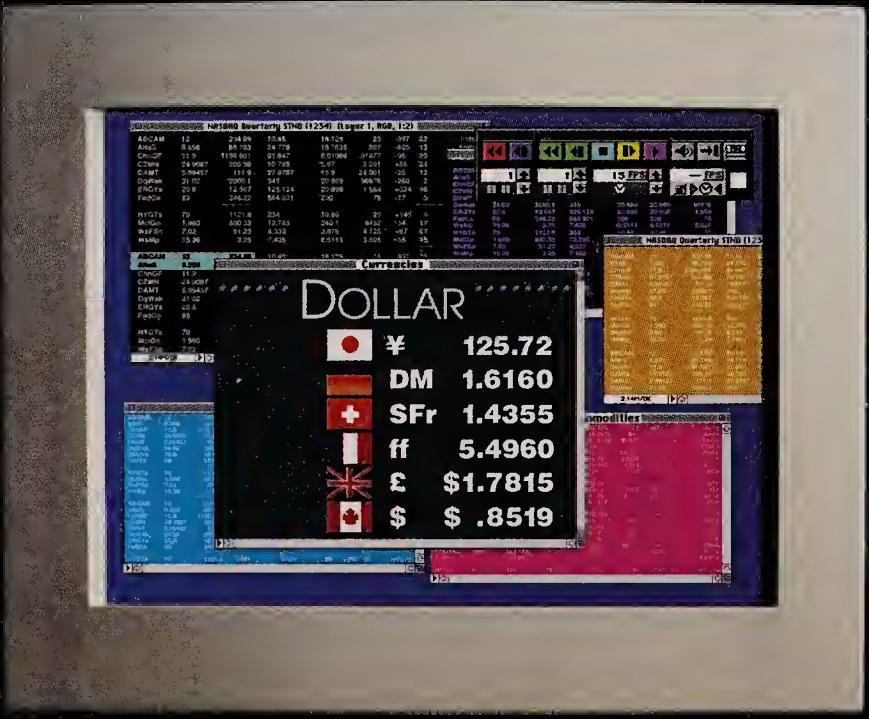

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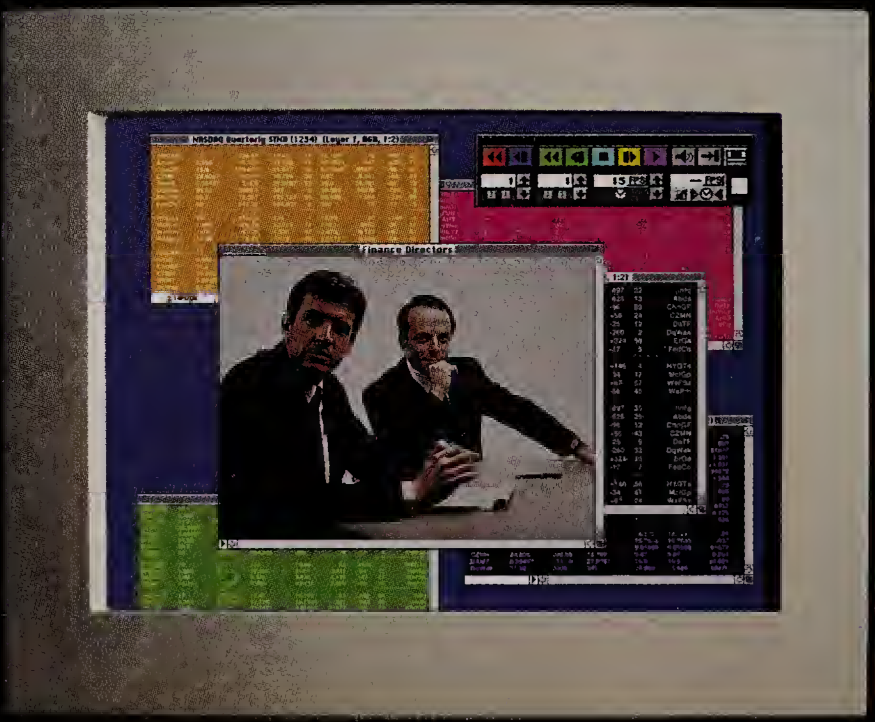

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A EUROPEAN TOUR

For many companies, cultural, geographical and technological conditions in Europe impose barriers to the effective deployment of strategic information systems

BY JACK EWING

After bumming around Europe for a few months in the 1870s, Mark Twain concluded, "A custom once established in these parts is imperishable." Unfortunately, that's not much of a motto for the computer age. Tradition isn't worth much in a field that remakes itself every few months.

Yet tradition still permeates European organizations. Structure and predictability reign. Formality is the norm, and first names are something Americans use. "Herr" or "Monsieur" are preferred, thank you. (Not many senior IS executives in Europe are "Fraus" or "Madames.") When it comes to computers, so the stereotype goes, Europeans just don't get it, and they never will. "I don't want to sound cynical, but I don't think they can catch up," says Edward M. Roche, author of *Managing Information Technology in Multinational Corporations* (Macmillan Publishing Co., 1992) and a visiting professor at the University of California in Berkeley.

ILLUSTRATION BY ADAM NIKLEWICZ

If corporate structures of European companies follow traditional European patterns, then it follows that CIOs, as relative newcomers, will have trouble penetrating top management. Think CIOs don't get no respect in the United States? In Europe it's probably worse, according to Roche. "IS managers have considerably less power," he says. Their bosses don't yet believe that what information managers have to offer is worth the cost.

But there is another school that says the state of IS in Europe is just fine; Americans simply don't understand European business practices. What Americans consider sluggishness is really just good sense, some in the business argue. Europeans are more cautious about buying new IT systems because they pay more attention to long-range planning than to the next quarterly report. Before running out to buy the latest IT fad, Euro-defenders say, European companies tend to think hard about whether it fits their extended needs.

"In Europe, we always have to evaluate everything first because it is seen as a strategic choice for many years," says Jos Groenland, a software consultant in Amsterdam for Softlab Benelux, a subsidiary of BMW. "These evaluations can take several months, or even years. So, yes, we are a few months behind because we are more cautious in adopting the new technology."

It's not just culture keeping Europeans back. U.S. dominance in IT also contributes to the lag. Like bald eagles and bison, hardware and software are bred in the U.S.A. (although the final product may be made in Taiwan). American hegemony in code writing means that software arrives on this side of the ocean months or even years after Americans have it. Manuals must be translated. Programs must be adjusted to accommodate the accents, umlauts and other odd punctuation marks that infest many European languages. Keyboard layouts differ. Accounting software has to adjust to local custom, currency and tax law. These factors can delay integration of new technology into European business.

> "IN EUROPE,
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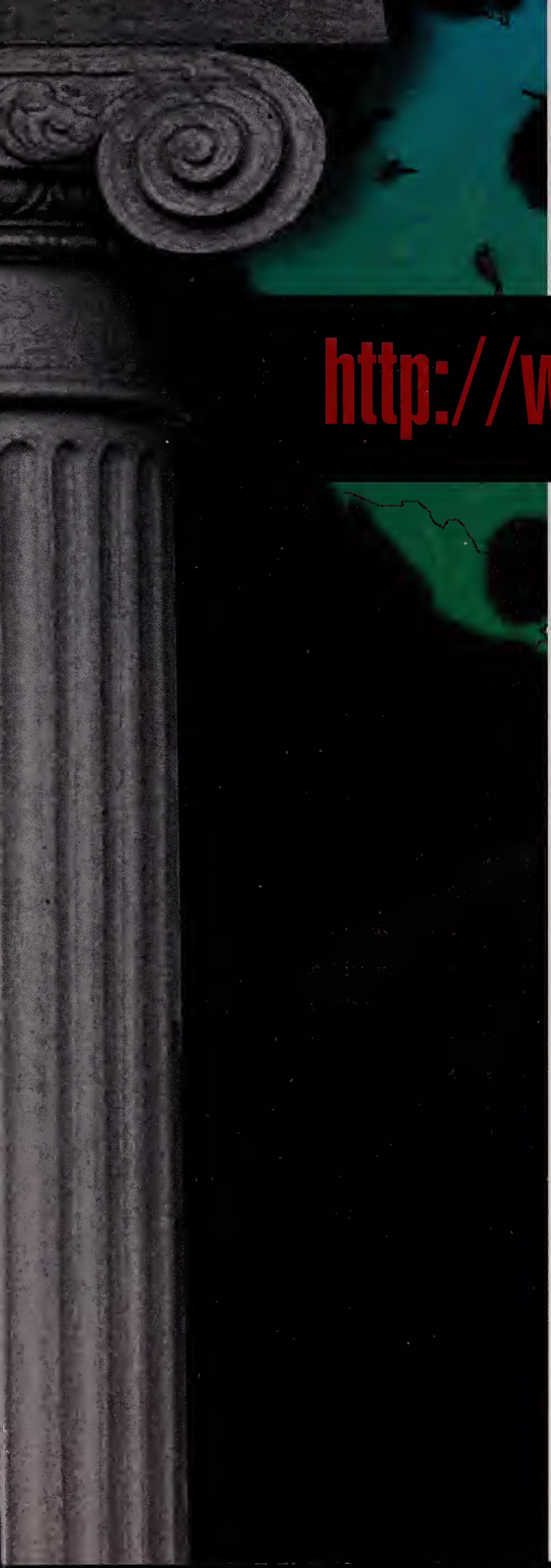
Jack Schofield, computer editor of *The Guardian*, the London-based daily newspaper, bristles at the generalizations about European backwardness with IT. "When people say, 'Europe is generally slower to adopt computer technology than the U.S.,' we have a nasty suspicion they are maligning our intelligence, if not our manhood," he says. "Certainly, if things are invented in California or Japan, we're often going to get access to them later—especially people who have to wait for screens or manuals in one of a dozen different languages. But there are other considerations, too. Computer equipment is more expensive in Europe, and this changes the economic equations."

According to Eric Gabas-Varini, marketing director for Lucas Management Systems' French operations in Paris, French IS executives use the experiences of U.S. companies as a testing ground, watching to see how new IT concepts play out there before deciding what to buy into themselves. "They really wait to see if it's not just a fashion," he says. Their conservatism is partly cultural, but it is also a function of French tax laws, which discourage investment in new computer equipment. "A lot of new things are really hardware dependent," he says. "They require investment. French CIOs wait to see that their old equipment is out of the books."

Bob Caldwell, general manager of Microsoft Corp.'s European Information Technology Group in Dublin, Ireland, agrees that European corporations are more skeptical of new technology. For example, Microsoft has tried to automate the transfer of purchase and sales orders with its customers and suppliers. Forms are exchanged and processed electronically. U.S.-based companies have responded to the system more enthusiastically than European companies, he says.

Some observers of the IT scene don't buy stereotypes, period. While certain generalizations about Americans and Europeans may be true, they say, geography and nationality are unimportant in a world of multinational corporations. "I don't see a very broad cultural difference," says Brian Stones, managing director of major account management for Ernst & Young's European operations in London. "From what I'm seeing, it depends on the type of business we're talking about and who that business competes with." Stones believes that companies in the energy business, for example, are at the forefront in their use of IT. Insurance companies are further behind, he says.

Werner Ruisinger, vice president for information systems at German auto and aerospace giant Daimler-Benz in Stuttgart, says flatly that



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INSTRUMENTS

there is no difference between the velocity of digital change in the U.S. and European business worlds. Daimler-Benz uses a multimedia system that allows designers in Sindelfingen, near Stuttgart, to work on plans for a new car with engineers in the United States and Japan. The company, a political as well as an economic force in Europe, has publicly pushed German and European officials to remove obstacles to IT development.

But beyond the rarefied world of high-powered multinationals, there does seem to be some evidence supporting the stereotypes, and the causes are not all technology related. Some British companies haven't changed their pyramid-shaped organizational charts since computers first came into widespread use in the 1960s and '70s, according to Gerry Lynch, who spent years as a data processing manager before becoming a lecturer in the Department of Computer Studies at Glasgow Caledonian University in Scotland. Lynch says that many managers in Britain are too tradition bound for the fast-changing nature of information technology. They still think of computers in terms of data processing. "They call it 'information services' because it sounds good," he says.

Lynch, whose students are mostly midcareer businesspeople, says IS managers must take some responsibility for their retro status. "There's quite a degree of complacency among technical people," he says. Many are content to remain cloistered with the mainframe in the basement, tweaking their equipment. "People in this country wait to see what Americans do first. They find it convenient to be maybe 18 months behind," he says.

The IS director in a typical French company does not participate in strategic decision making, according to Lucas Management's Gabas-Varini. That makes it hard to align IS operations with company strategy and convince top managers of the importance of IT. Something else holds French CIOs back: Top managers in France still tend to come from a small number of prestigious universities, while IS executives are more likely to have attended a less-prestigious technical university, and thus are not part of the establishment. That makes it hard for them to crack the upper ranks.

Many causes of European regressiveness with IT are beyond companies' control, according to Roche. For one thing, unlike the aggressive startup companies that drive innovation in the United States, Europe's IT vendor communities are dominated by big corporations with close ties to government. Telecom costs are extremely high. And European Union labor laws make it difficult, for example, to change an employee's job description to reflect changing technology.

Accounting and communications are more complicated than in the United States. France, Germany and Italy might all be members of the European Union, but they speak different languages, have different tax laws and use different currencies. Phone systems differ, complicating data transmission. "You talk of 'Europe,' but it's still a bunch of different countries," Roche says.

Europeans endure a level of bureaucratic intervention that appalls Americans. Officials may scrutinize something as trivial as the location of a wall socket. Strict building codes—designed to protect historic structures—can frustrate remodeling needed to accommodate new equipment, says Ronald McCarthy, network administrator at the University of Maryland's campus in Schwaebisch Gmuend, Germany.

Bureaucrats sometimes seem to be reflexively trying to impose order and deliberation on the unruly computer industry. McCarthy notes that in Germany, all connections to the telephone system are subject to approval by Deutsche Telekom, the telephone monopoly. Even ordinary modems still require approval, at least in theory; the rule is rarely enforced.

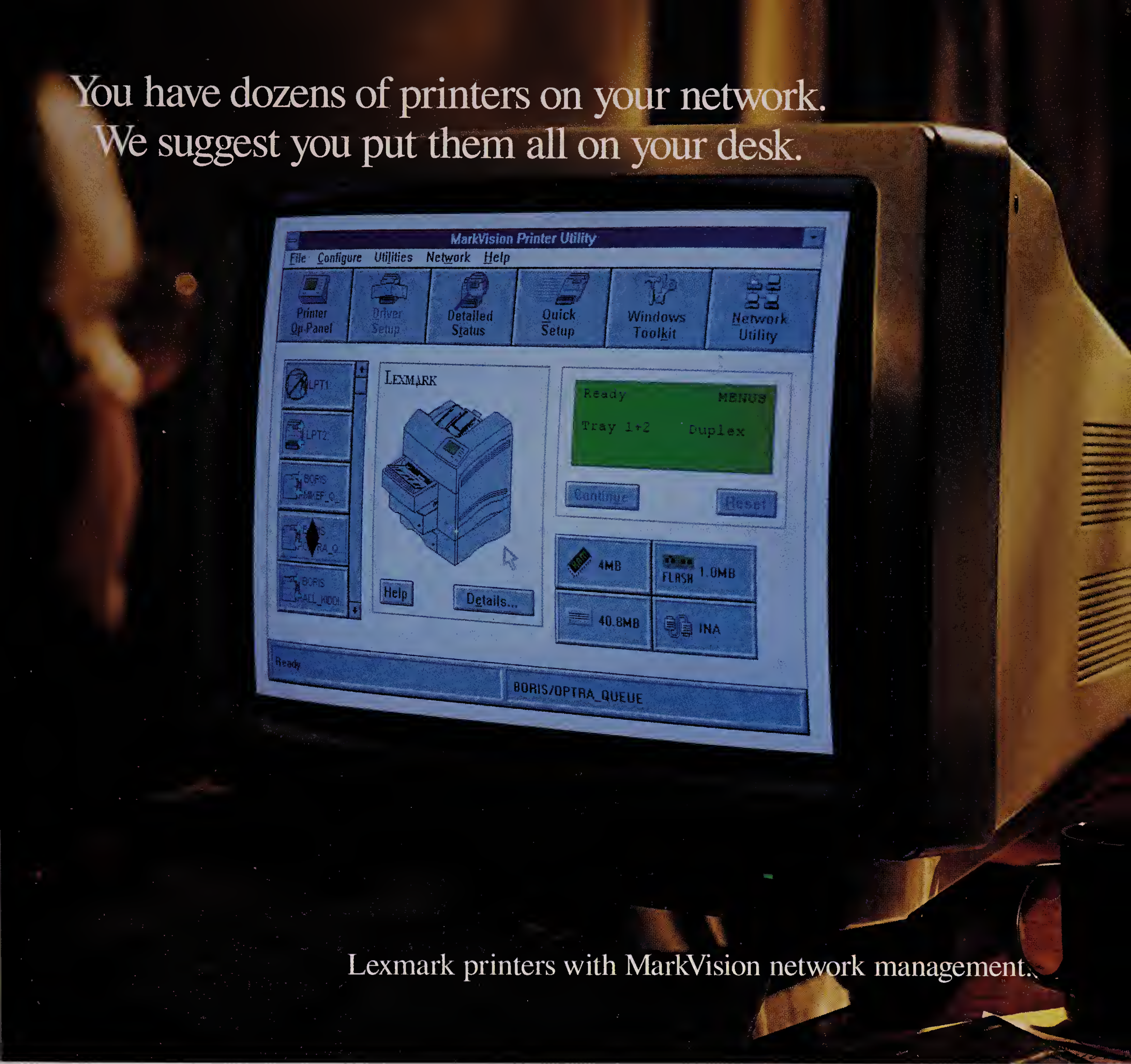
In short, Europe lacks the flexible structures that encourage innovation, says Roche. "There's not a learning gap, there's a doing gap. They're not stupid. They just can't quite work through the complexities of the European system." IS executives who make it through these obstacles to build successful systems will at the same time build their own credibility and stature within the organization.

In at least some cases, though, the intricacies of government regulation and cross-border trade have helped elevate the importance of corporate CIOs. Schofield of *The Guardian* argues that Europeans, of necessity, are ahead of the United States in the use of open

The Avant Garde

There are some areas of IT implementation in which European companies or agencies are ahead of organizations in the United States. For example, the French probably lead the world in the everyday use of electronic cash cards. And France's Minitel system introduced online mass marketing a decade before the World Wide Web—itself developed at CERN, the European Laboratory for Particle Physics in Geneva—became the rage in U.S. marketing circles. (Germany has a similar service called Datex J, but it has not won the same level of consumer acceptance.)

Some native technology manufacturers have recognized the need for Euro-specific computer products and have profited as a result. Building on its success in Europe, SAP AG of Walldorf, Germany, maker of popular business systems, is now expanding aggressively into the American market. *–J. Ewing*



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systems (despite the high cost of telecommunications). Each nation has its dominant manufacturer, such as Siemens Nixdorf in Germany or Olivetti S.p.A. in Italy, which tends to control the local market. (In France, nationalized companies were until recently required to buy local equipment.) Companies had to learn how to work with a diverse collection of hardware if they wanted to do business across borders.

Europeans' experience dealing across barriers of culture and language is an advantage as the business world becomes ever more global. Roche, despite his generally pessimistic view of European IT, acknowledges that Europeans probably have an advantage communicating with the emerging nations of Eastern Europe and the former Soviet Union. European countries have many émigrés, sometimes very well educated, who speak languages like Estonian or Albanian. Europeans are more likely to speak a second or third language other than their own.

The desire to expand globally is one reason that German chemical giant BASF gave its information-related operations divisional status in 1987. Until then, the department had served only company headquarters in Ludwigshafen.

THE DESIRE TO EXPAND GLOBALLY IS ONE REASON BASF GAVE ITS INFORMATION-RELATED OPERATIONS DIVISIONAL STATUS.

Recently, the company has expanded into Eastern Europe and the former Soviet Union. Despite some formidable cultural, regulatory and technical obstacles, BASF is trying to build an integrated information technology system. As a result, the company's IT division has gained in importance during the last several years, according to a spokesman for the firm.

Even if companies like BASF are still the exception, Microsoft's Caldwell sees reason for optimism. European universities, long criticized for being too traditional, are turning out better-trained graduates, he says. Though telecommunications are still more expensive, the national telecom companies are starting to compete with each other to provide cross-border services. Caldwell says that Europeans know they have a problem and are trying to do something about it.

So don't write off Europe just yet. "I think they'll catch up," Caldwell says. "There's definitely an investment being made—a conscious investment. I'd give them about five years."

Jack Ewing is a freelance writer based in Stuttgart, Germany. He can be reached via e-mail: zvaj1098@servus.rus.uni-stuttgart.de.

Class Consciousness

The debate over the proper and likely future role of IS leadership has been going on in the United States for years now, and it is playing out in Europe as well. Should the CIO be primarily a master technician or a business strategist? And what effect will the increasing computer literacy among general business executives have on the IS executive's fate? (For an in-depth discussion of these issues, please see "The New IS Role Models," *CIO*, May 15, 1995.)

Thomas Loy, a computer risk management partner at Arthur Andersen in Frankfurt, Germany, says that as computers become easier to use and purely technical skills lose their value, there will be less of an imperative to give information systems executives a seat at the boardroom table. Brian Stones, managing director of major account management for Ernst & Young's European operations in London (and an IT manager in the aerospace business before joining E&Y), sees the growing transparency of business systems prompting a greater need for someone minding the architecture/infrastructure issues.

As more people use computers routinely, says Stones, there is a greater need for CIOs to take on what he calls "infrastructural stewardship." Someone needs to set standards and establish protocols. Otherwise, businesses will experience the uncontrolled proliferation of incompatible computer technology that occurred in the 1970s. "We're still paying the price for that," he says.

–J. Ewing

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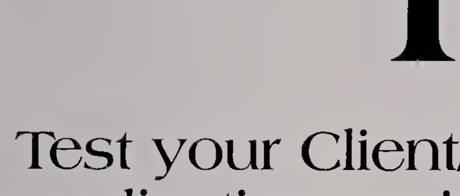

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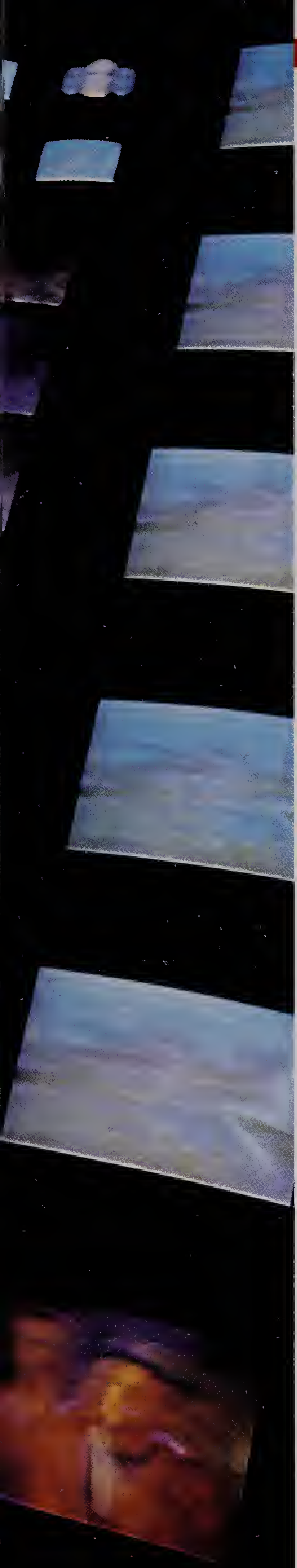

Daring To Look Down

No one likes to think about computer downtime, but pretending that it can't happen is asking for even worse trouble. Before preparations can begin, CIOs must accept the inevitability of such failures and do their best to estimate the costs.

After struggling for a generation to make colleagues aware of the crucial role information technology can play in the success of a business, CIOs must now face the consequences of having proved the point. To the extent that they have done what they set out to do, CIOs are on the hot seat. Systems must not fail—or, if they do, customers expect them to be brought back online immediately. Coming to terms with the inevitability of downtime, and calculating its cost, are two more items on the CIO's to-do list.

BY MICKEY WILLIAMSON

Some industries are more vulnerable to computer downtime than others. Hewlett-Packard Co.'s disaster

PHOTO BY KENT HANSON

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> **"If we have a disaster here and the plant can't make seats anymore, the computers aren't going to do us any good, so that's not a mission-critical concern for us."**
>
> *–Scott McMahon*

recovery unit in Palo Alto, Calif., lists insurance, health care, financial services, manufacturing, transportation and utilities as high-exposure industries. Retailers that rely on point-of-sale systems for inventory control are in that class as well.

Computer failures fall into two broad categories, according to Gregory Therkalsen, vice president of Comdisco Professional Services Group, a disaster recovery services provider in Rosemont, Ill. Each group requires its own planning strategy. What Therkalsen calls "operational downtime" is caused by "failures of hardware components, network failures, failure of a common carrier's central office—things that happen with a higher degree of frequency but usually have a limited duration and impact," he says. "They take a system down for minutes or an hour or so, but they're not catastrophic." The other type, in which fire, flood, earthquake or hurricane brings down either the company's systems or those of a vendor on which the company relies—a telecommunications common carrier, for example—may be devastating to some companies, but not to others.

Scott McMahon, MIS manager at Integram St. Louis Seating in Pacific, Mo., is one for whom an operating failure can be extremely costly. Integram is a just-in-time supplier to Chrysler Corp.'s St. Louis minivan plant. "Between our dock door and their assembly line is about two hours' worth of seats," McMahon says. "If we don't continue to keep that pipeline full, we will shut down the Chrysler plant. They can't drive the vans off the assembly line without seats in them."

So intent is Chrysler on keeping the St. Louis plant's 2,000 employees working that the auto maker's contract with Integram contains a penalty of "more than a thousand dollars a minute" if a failure of the seat maker's computer-controlled manufacturing process causes a shutdown at the Chrysler plant, McMahon says. "They aren't very happy at all when we shut them down. With that much money, and the unhappiness that comes with it, you can spend a lot of money on fault-tolerant computer equipment to avoid downtime, and that's what we've done." Since he installed a fault-tolerant computer from Sequoia Systems Inc. three years ago, McMahon says, his company hasn't had any unplanned downtime.

By contrast, natural disasters such as the great Midwest flood of 1993 hold less-grievous consequences for Integram, says McMahon. "If we have a disaster here and the plant can't make seats anymore, the computers aren't going to do us any good, so that's not a mission-critical concern for us."

The same might be said for furniture retailer Art Van Inc., of Warren, Mich. A disaster bad enough to close the store would keep customers away, but if an operational failure brought down the company's computer, customers "can walk down the street and buy a similar product from someone else," says Dan Mehall, the company's information systems manager.

PHOTO BY MARC BERLOW

Before the company reengineered its business processes, furniture sales were recorded on handwritten documents at each of Art Van's 22 retail outlets. "If the computer went down, it didn't impact the business or create an inconvenience. Even if the sales force couldn't check inventory, they could still write business," Mehall says. Today, not only are sales dependent on the computer but the warehousing operation also is "completely tied to the uptime of the system. Without it, we can't move goods, so we could lose several hundred thousand dollars in an hour of downtime on a busy weekend." To avoid operational failures, Art Van has also installed a fault-tolerant system.

The cost-avoidance benefit of averting computer outages is no trivial matter. If a critical system is inoperable for six days without a suitable replacement, the loss to the company could amount to a total of 200 percent of the net daily income produced by the system, according to R.A. Elbra, author of *Contingency Planning*, a technical report published in 1989 for the National Computing Center in London. That loss could jump to as much as 800 percent of net daily income if the outage lasts 12 days.

For Robert Chin, CIO at Healthsource Inc., a medical claims processing company in Hooksett, N.H., quantifying the cost of downtime is a bracing experience. He multiplies the number of hours that employees are nonfunctional by $250 to $500 per day per person, depending on who is affected. "Therefore, if the system went down and our 1,000 employees were unproductive for one day, that would cost between a quarter- and a half-million dollars, taking into account salary, benefits and opportunity costs. There is also the potential of additional work related to poor customer service," he explains. "It's not particularly scientific, but it keeps us on our toes."

Gerald Shaw, director of internal audit for Blue Cross & Blue Shield of Maine, worked with SunGard Planning Solutions Inc. of Wayne, Pa., to analyze the impact of a computer failure and "came up with a figure of $500,000 if we went down for three days." The South Portland health insurance provider manages about $500 mil-

"If the system went down and our 1,000 employees were unproductive for one day, that would cost between a quarter- and a half-million dollars, taking into account salary, benefits and opportunity costs."

– *Robert Chin*

PHOTO BY BILL TRUSLOW

PHOTO BY JEFFREY STEVENSEN

"**If our internal customers say we need to be able to resume paying claims within four hours following a fire in the data center, then we have to go out and develop a recovery plan that meets that business objective."**

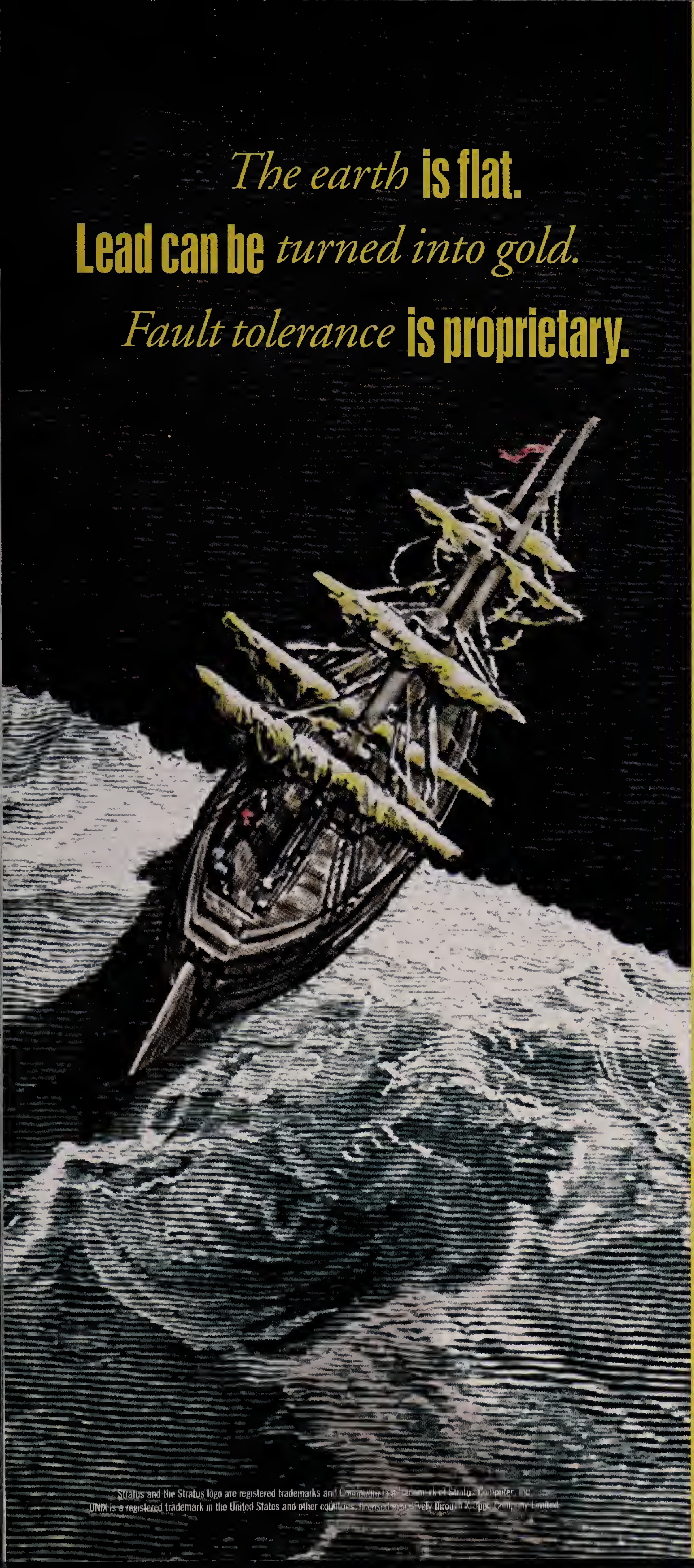
–David Stacy

lion of its own billings; it also handles nearly $100 million in billings for three other companies that it manages or controls. Yet Shaw looks at the cost of downtime in an entirely different light because of the way his company does business.

Opportunity costs––the revenues lost due to computer failure—do not figure into Shaw's calculations. "We bill a month in advance of the premium's due date, and it's very unlikely that we would be down for an entire monthly billing cycle, so loss of income is not an issue," he says. In Shaw's view, electric power outages represent the greatest threat to his computer operations. To avoid the possibility of such failures—and the work that would pile up as a result—Shaw has installed an uninterruptible power supply (UPS) system and an auxiliary generator. "The generator will allow us to run the mainframe, most of our terminals and the lighting systems," he says, adding that this system could maintain operations for "a day or so but not as much as a week."

A day's downtime may not mean disaster for a health insurance provider, but it might for a brokerage company. So critical is contingency planning for financial institutions, in fact, that the U.S. Controller of the Currency requires such corporations to "be able to articulate what kind of contingency and backup capabilities we have," says Thomas Fogarty, technology services group executive with Chase Manhattan Bank, based in Brooklyn, N.Y. "We do risk profiles on various systems and, depending on the type of system and the risk, we do things that enable us to serve our customers even if a component fails."

Fogarty's risk assessment takes into account the impact on customer service and financial transactions if a computer goes down. To combat such problems, Chase has insti-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tuted backup systems and journaling systems that enable the institution to replicate transactions for which records might otherwise have been lost; in the event of a failure, it will "fall over to the [backup] system that's been keeping track of what has been going on," he says. "As a customer, you wouldn't even notice that there was a failure."

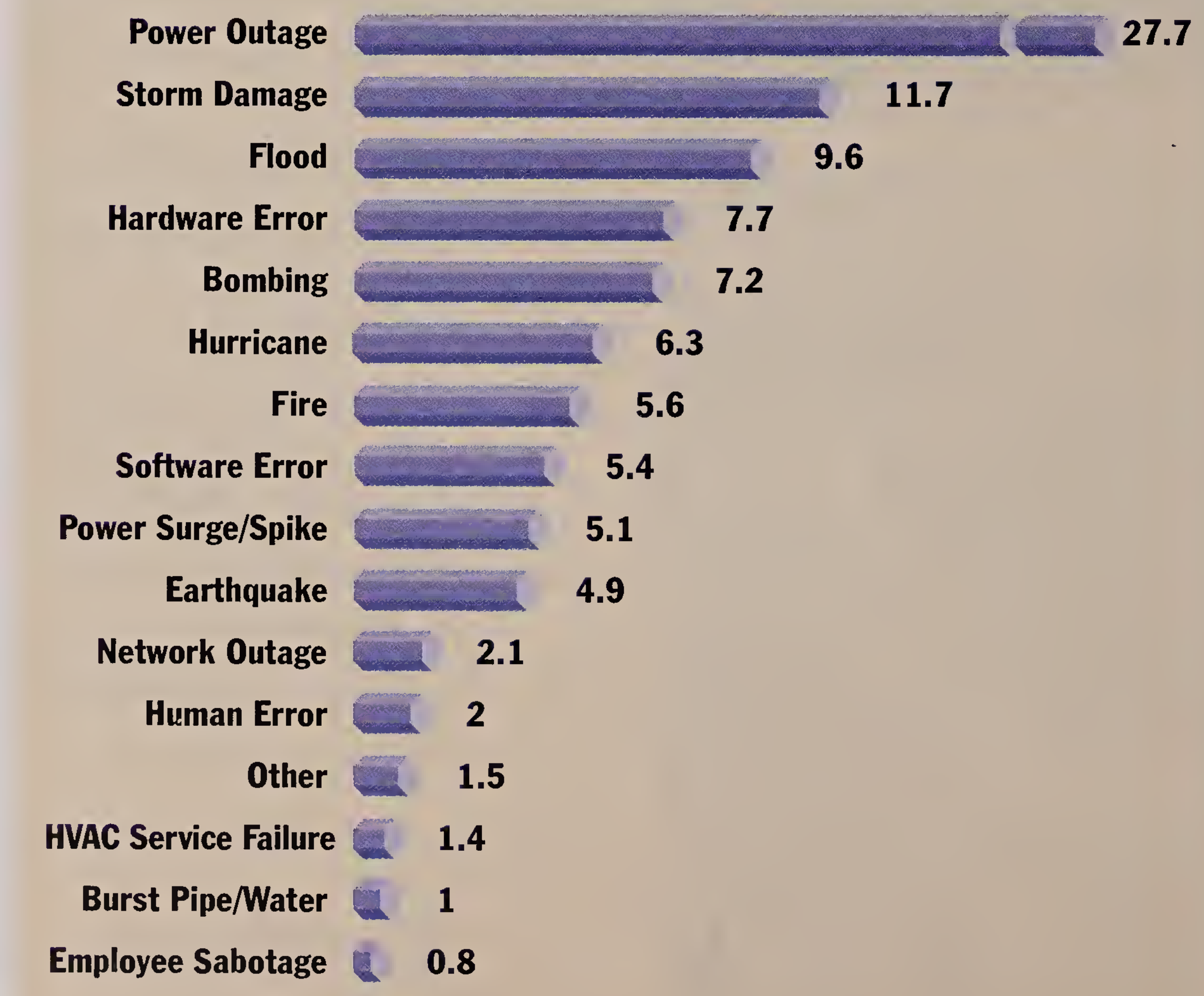
The fact that UNUM Life Insurance Corp. recently named David Stacy, its former manager of information security services, to the new position of manager of enterprise resumption planning is a good gauge of how seriously the company takes computer downtime. In addition to running most of UNUM's mission-critical systems, a single mainframe also handles its telecommunications network and electronic mail. A system outage would affect nearly all of UNUM's 6,000 Portland, Maine-based employees.

Stacy hasn't tried to estimate the per diem cost of a system failure, but "it's obvious that an interruption in the services that those systems provide, and the information that they provide for the people who are running the business, would be unacceptable," he says. He questions the value of "putting an awful lot of time into a quantitative analysis because it's obvious that we have to have good recovery capability in order to keep this business going."

Drawing an analogy to the way he decided to buy life insurance to protect his family, Stacy explains. "I don't sit down and look at the monthly premiums and at the probability of dying tomorrow or 10 years from now. I look at the impact it would have on my family and make a decision as to how much protection I want to buy," he says. "We've taken a similar approach to disaster recovery planning. You could get into the probability of hundreds of different events that could potentially shut our data center down, and you're talking about probabilities that are measured in five or six decimal places. Most people can't relate to that kind of information, but when you talk about not being able to pay claims for a week, to underwrite new business, or issue a new policy for a week, they can relate to that."

THE DOWN SIDE

The most common sources of downtime, in order of frequency of occurrence (expressed as percentage of total)



SOURCE: CONTINGENCY PLANNING RESEARCH, INC. JAN. 30, 1995. BASE: 5,320 OUTAGE INCIDENTS SINCE 1982

Stacy is not alone in downplaying the necessity of putting a price tag on downtime. Says Shahla Butler, associate director of American Management Systems' Center for Advanced Technologies in Arlington, Va., "To focus on the cost of downtime is coming into the problem in the middle. The really important factor is the reason downtime occurs."

Butler places the cause of operational system failures in two groups: technical failures and organizational ones. Technical failures can occur because a system has poor design, insufficient infrastructure, poor architecture, excessive and poorly understood complexity, or because it was built using an untried or immature technology. Organizational causes of failure include the possibility that the people supporting the system lack sufficient training and skills, or that the systems are improperly used, she says.

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may also be unrealistic, Butler suggests. "The most important questions are, 'What kind of system are we designing,' and 'What are its requirements?' If we [always] try to impose the requirement of 24-by-7 availability, we are setting ourselves up for failure," she says. "If you say that every possible system has to be available around the clock, then failure is inevitable. But if you have defined reasonable availability, and have installed reasonable technology to support that availability, then I think failure is not inevitable."

Whatever the system, whatever the architecture, companies need to consider their approach to system downtime. When it comes to preparing for operational failures, most organizations are already doing a good job, says Comdisco's Therkalsen. "Most companies build operational failures into their basic IT budgets," he says. "To provide 99.9 percent availability to their customers, they'll buy UPSs and diesel generators for their data centers. They'll ask their telecommunications company to route their lines through two or more central offices instead of just one. That way, if one fails they don't lose all of their ability to communicate with the outside world. Most CIOs do not apply a rigorous method to analyze those costs; they take it as a normal part of doing business, driven by the real or perceived level of service that the users want."

"The most important questions are, 'What kind of system are we designing,' and 'What are its requirements?' If we always try to impose the requirement of 24-by-7 availability, we are setting ourselves up for failure."

–Shahla Butler

Planning for disaster recovery is a different matter. There, Therkalsen says, companies should perform one or two types of studies. "One is a fairly formal risk analysis where they consider the 10 or 15 really bad things that could happen—fires, floods, earthquakes—and measure the impact of that kind of event in terms of lost revenue, service to their internal customers and so forth."

The second type of study is a business-impact analysis, in which IS staff interviews senior executives in the major business units to assess their overall reliance on information technology for strategic purposes. "If they didn't have it, how bad would it be in 24, 48 or 72 hours? A week? Two weeks? A month? That's the kind of stratification to use," he explains.

It makes no difference whether critical systems are running on a mainframe or distributed processing architecture, according to Therkalsen. "There may be no data centers, but there are still the same old operational problems that existed 15 or 20 years ago in the mainframe environment: that is, backup and restoration of the data, keeping the LANs up," he says.

At UNUM, Stacy has found a way to make peace with the notion that downtime is inevitable. "Statistically speaking, most data centers will have some kind of extended interruption [over] some long period of time—say [every] 50 or 100 years," he says. "Some kind of natural disaster will happen sometime; we don't know what it will be or when it will be, so we must take reasonable precautions to make sure that when that day does come, we'll be prepared to deal with it and respond within a time frame that is acceptable to the people for whom we operate this data center."

Letting the company's internal customers define their level of tolerance for system outages is key, according to Stacy. "When we do disaster recovery planning, we don't focus on any one risk," he says. "We take a worst case scenario, in which our data center could be leveled to the ground, in smoke and rubble. We need to be able to recover from that devastation and restore our critical data processing—but not everything—within a reasonable time frame. And that time frame is defined by our business customers. If they say we need to be able to resume paying claims within four hours following a fire in the data center, then we have to go out and develop a recovery plan that meets that business objective."

Since UNUM's data center provides services to business units on a fee-for-service basis, recovery requirements are carefully considered. Business units can demand a high level of recovery if they require it, but Stacy says he would carefully question any demand for recovery capability greater than the 24 to 48 hours UNUM is working toward in its current recovery planning. "We do ask questions," he says, "because as the recovery window decreases, the cost of recovery preparedness increases, and those costs are reflected in higher fees to the business units." CIO

Mickey Williamson is a technical journalist based in Warwick, Mass. Her Internet address is qwertygroup@mcimail.com.

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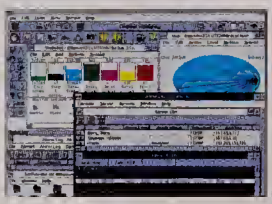

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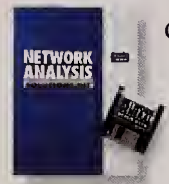

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DUE PROCESSING OF LAW

The judicious use of IT can improve law firms' ability to communicate and manage huge volumes of documentation

BY MEGAN SANTOSUS

While lawyers have reputations for many things, being well-versed in the ways of information technology is not one of them. But the tide is turning, particularly at small law firms going head to head with larger rivals while keeping the ranks of support staff relatively low.

"The law—which is essentially all about communication and document management—is one of the last businesses where people have adopted technology," says Fred Bartlit, a founding partner at Bartlit Beck Herman Palenchar & Scott, a commercial litigation firm in Chicago. A majority of lawyers may have computers, but it's Bartlit's contention that "80 percent are paperweights."

Things are decidedly different at Bartlit's firm, where every lawyer is expected to have a working knowledge of PCs. In fact, technical skills such as remote e-mail, word processing and document retrieval are evaluated as part of an attorney's performance review.

"There's a real change going on at law firms that is affecting the way work gets done," observes Bob Womack, the director of computer services at the law firm of Hale and Dorr in Boston. "More of the legwork is being done by partners, so it's important to give them the tools that they need."

Don Bivens, a partner in the Phoenix law firm of Meyer Hendricks Victor Ruffner & Bivens, predicts that technology will eventually have a significant impact on legal firms' organizational structure. "With technology and a good paralegal, a lawyer can do the same amount of work as three associates," he says. In response, "law firms must change. Gone are pyramid hierarchies with a lot of associates at the bottom."

PHOTO BY REED RAHN

DON BIVENS: *"With technology and a good paralegal, a lawyer can do the same amount of work as three associates."*

The technology being implemented at law firms falls into two distinct categories. The first involves basic office applications such as word processing, e-mail, desktop faxing and scanning. "A lot of efficiencies can be realized with general-purpose technologies because lawyers are in the business of processing information and generating documents," says John E. Morris, editor at large of *American Lawyer,* a magazine published in New York. It's the second category of applications, those that go to the heart of a lawyer's practice, that promises to have a dramatic impact on the profession.

Litigation is a prime target for the application of IT due to the complexity of cases and the sheer volume of documents involved. Litigation-support systems—which typically include imaging, text-retrieval and document-assembly software—can make the clerical aspects of a litigator's job a lot less taxing. They also offer lawyers a way to easily zero in on vital information, collaborate with colleagues and pursue ideas in a more dynamic way.

> **"The smaller firms have a tremendous advantage in terms of using technology because we can instill an institutional commitment to implementing it. Everyone from the senior partner to the mailroom guy is computer literate."**
>
> *–Philip Beck*

At Hale and Dorr, attorneys use an imaging system to review documents online and select those that are most relevant to a particular case. Paralegals then index and catalog only those documents that have been selected. In the past, all documentation was indexed up front, leaving it to the lawyers to sift through material that they didn't need, Womack says.

Increasingly, laws firms are turning to document-assembly software to generate and customize common legal documents such as contracts and trade agreements. In addition to an assembly engine, many of these systems contain expert-system components that automatically annotate the material. For example, a lawyer drafting a trade agreement between an American and a British company may have annotations relevant to each nation's jurisdiction stored in a database. As the lawyer generates the document, the annotations providing expert comments and suggestions automatically appear.

Lawyers at the New York firm of Weil, Gotshal & Manges are using a Lotus Notes-based application to organize their case documents, research

Trial Runs

· ·

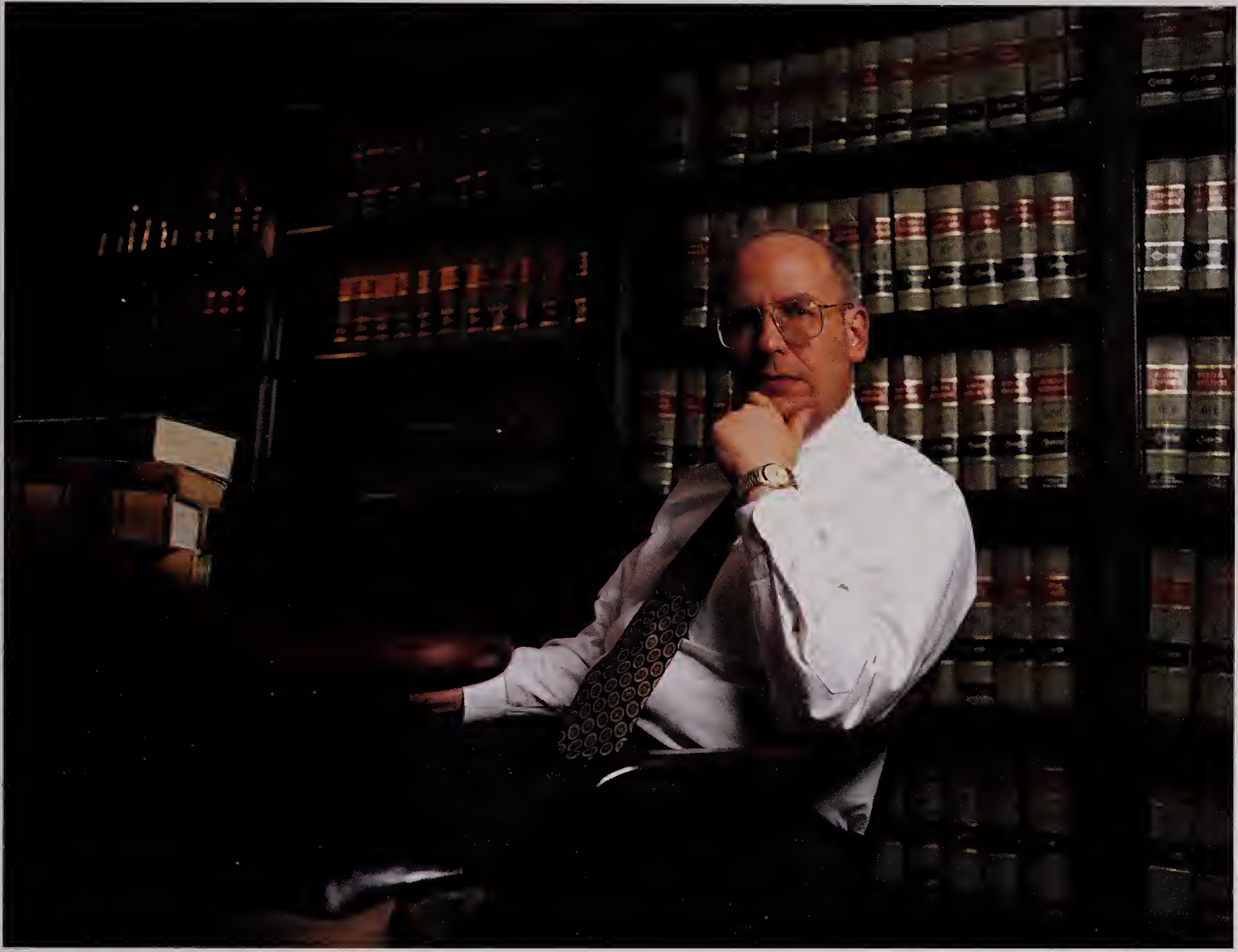
Technology is supporting law-office operations and bringing order to the courts. These two centers let you try out the latest.

The LawTech Center, located at the Chicago headquarters of the American Bar Association (ABA), is chock full of the latest law-office applications and hardware. Visitors can stop by for a hands-on demonstration of such things as CD-ROMs, computer-assisted legal-research services, document-assembly software and litigation-support systems, which help manage the entire litigation process from scanning in documents to retrieving them with full-text search capabilities.

The center is part of the ABA's Legal Technology Resource Center, which offers a variety of services, including market research and vendor referrals. ABA/net, created in partnership with AT&T EasyLink Services, provides online access to information databases of interest to lawyers.

Courtroom 21, located at the Marshall-Whythe School of Law at the College of William and Mary in Williamsburg, Va., is billed as "the most technologically advanced courtroom in the world." It is an experimental facility where lawyers, judges and court administrators can evaluate commercially available technologies and decide how they can best put them to work in the courtroom setting. Jury members are equipped with computer monitors to view CD-ROM-based evidence applications; the size of the images can be manipulated with a light pen and bar-code system. The monitors are also capable of displaying text, graphics and television pictures, including multimedia computer simulations. Trial participants have instant dial-up access to Lexis and WestLaw, two of the most popular online legal research services.

Courtroom 21 is also used to educate students and visiting judges. The facility was developed in conjunction with the National Center for State Courts, with equipment installed, maintained and updated by a variety of technology manufacturers at their own expense in return for demonstration and feedback. "The overall goal of the project is to make legal proceedings faster, more accurate and cheaper to the degree that it's possible," says Fred Lederer, chancellor professor of the law school. Eventually, the project will spread from the courtroom to encompass every facet of the legal community. *–M. Santosus*



BOB WOMACK: *"More of the legwork is being done by partners, so it's important to give them the tools that they need."*

PHOTO BY JULIE HOUCK

materials, deposition transcripts and memos in a single repository. About 2,000 AST desktop machines are linked nationwide through a wide area network, allowing dispersed colleagues to share their expertise quickly. While this boosts productivity, it's the qualitative aspect that impresses Todd L. Mattson, the firm's manager of computerized litigation support. "What's most important about a document in litigation is not its contents but what lawyers think about the contents," he explains.

For example, as issues change during a lengthy case, lawyers may come up with ideas while writing briefs. Notes allows the litigation team to capture and follow up on ideas dynamically, something that was impossible when a paralegal was needed to do research. Notes' hypertext links enable lawyers to click on a word and pursue a train-of-thought idea without stopping to write a note to a paralegal. Mattson believes that this kind of empowering ability is where technology will really pay off.

At the current stage of implementation, technology can also be a way for a law firm to differentiate itself from the competition. During a merger proceeding of one of its clients, Los Angeles-based Howrey & Simon had to produce 700,000 pages of documents—sorted into 24 categories, date stamped and organized chronologically—for the government. With scanning technology, it took three people one week to do what it would have taken 50 people months to achieve manually, according to Matt Ghourdjian, formerly the firm's national director of technology, now director of MIS for Hennigan & Mercer, a Los Angeles law firm recently split from Howrey & Simon.

Howrey & Simon's imaging system makes roughly 25 million pages of case documents available online. A wide area network connects the Los Angeles and Washington offices, and 50 clients are linked to the firm via digital lines. Another 400 clients have dial-up or Internet connections to its e-mail system. The firm was recently retained to handle the Orange County (Calif.) bankruptcy proceedings, and Ghourdjian believes that its ability to use technology effectively played a part in the hiring decision.

When Bartlit and Senior Partner Philip Beck founded their firm in

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1993, the two men believed that technology would give their 30-lawyer outfit an edge. "The smaller firms have a tremendous advantage in terms of using technology because we can instill an institutional commitment to implementing it," says Beck. "Everyone from the senior partner to the mailroom guy is computer literate."

All Bartlit Beck lawyers, most of whom put in a fair amount of travel, have Toshiba 486 notebooks linked by a Novell local area network. While on the road, lawyers use modems to dial into the network, where case documents are indexed according to standard fields such as client, author and document type. The material is also full-text indexed using Discovery ZX for Windows (from Stenograph Legal Services Inc. in Morton Grove, Ill.), allowing lawyers to search by field, content or a combination of both. Every document on every case is stored in the database and is retrievable in seconds, thanks to Docufind, a litigation-support program from Arthur Andersen & Co.

TODD MATTSON: *shared opinions*

PHOTO BY KENT HANSON

Say a lawyer wants to find all the briefs containing the term "preliminary injunction." Without technology, he or she would go to the library, pull relevant documents from files, photocopy pages, paste citations into a handwritten draft and forward it to a secretary for typing. Today the search request is entered and a "hit" list of documents produced. Text can be copied or pasted into a WordPerfect document and routed electronically for review by other lawyers or to clients with e-mail connections.

While such changes may be easier for smaller organizations to embrace, large firms are beginning to get on board as well—in many cases at the urging of their clients. Hale and Dorr, with its 250-plus lawyers, represents many small and emerging companies in industries that move at lightning speed. "We're trying to fashion processes that allow us to work within the decision cycle of our clients," explains Womack. One of the infrastructure's selling points is 24-hour Internet access that includes a home page (*http://www.haledorr.com*) where people can access bulletins on legal topics or read biographies of senior partners. The firm is also a big user of imaging, database and desktop videoconferencing technology as a way to improve efficiency and communication.

Using an expert system with a document-assembly engine from Capsoft Development Corp., in Provo,

Brief Encounters

E-mail is providing some law firms with closer links to their clients

Following a mock trial, in which lawyers practice their presentations in front of a jury, Jan Hoynacki, chief counsel of contracts and litigation at United Technologies Corp. in Hartford, Conn., spent a few days in an electronic debriefing session with lawyers from the Chicago litigation firm of Bartlit Beck Herman Palenchar & Scott.

"The e-mail chatter that went on in the 72 hours after the trial was invaluable. People were able to share and respond to train-of-thought ideas," he says.

Brainstorming between law firm and client is just one benefit of the improved communication that comes with e-mail. According to Bartlit Beck Senior Partner Philip Beck, once e-mail links are established with clients, as much work as possible is conducted electronically. For example, drafts of documents are exchanged over the wires, eliminating the need to overnight or fax hard copies back and forth. The result is an improved process in which in-house counsel and their outside lawyers can better collaborate on cases.

"Having an e-mail connection with a firm enables us to be part of a litigation team," says Hoynacki. "Unlike other in-house law departments, we don't throw cases over the transom and forget about them. E-mail lets us work closely with our firms on a daily basis."

E-mail links are also enhancing service to clients at Wilmer, Cutler & Pickering in Washington. In addition to document revisions, clients and lawyers exchange e-mail to set up important meetings or broadcast messages. Even suppliers are being asked to link up. "We bill things like travel expenses and overnight delivery services back to our clients," says Ron Friedmann, the director of computer applications. Frequently used vendors for other services such as court reporting have either e-mail links or can provide the firm with ASCII disks. While paper-based bills are still necessary for auditing purposes, the firm encourages outside companies to adopt at least enough automation to avoid keying data into its system. "One criteria for selecting suppliers is whether they can upload information directly into our accounting system."

–M. Santosus

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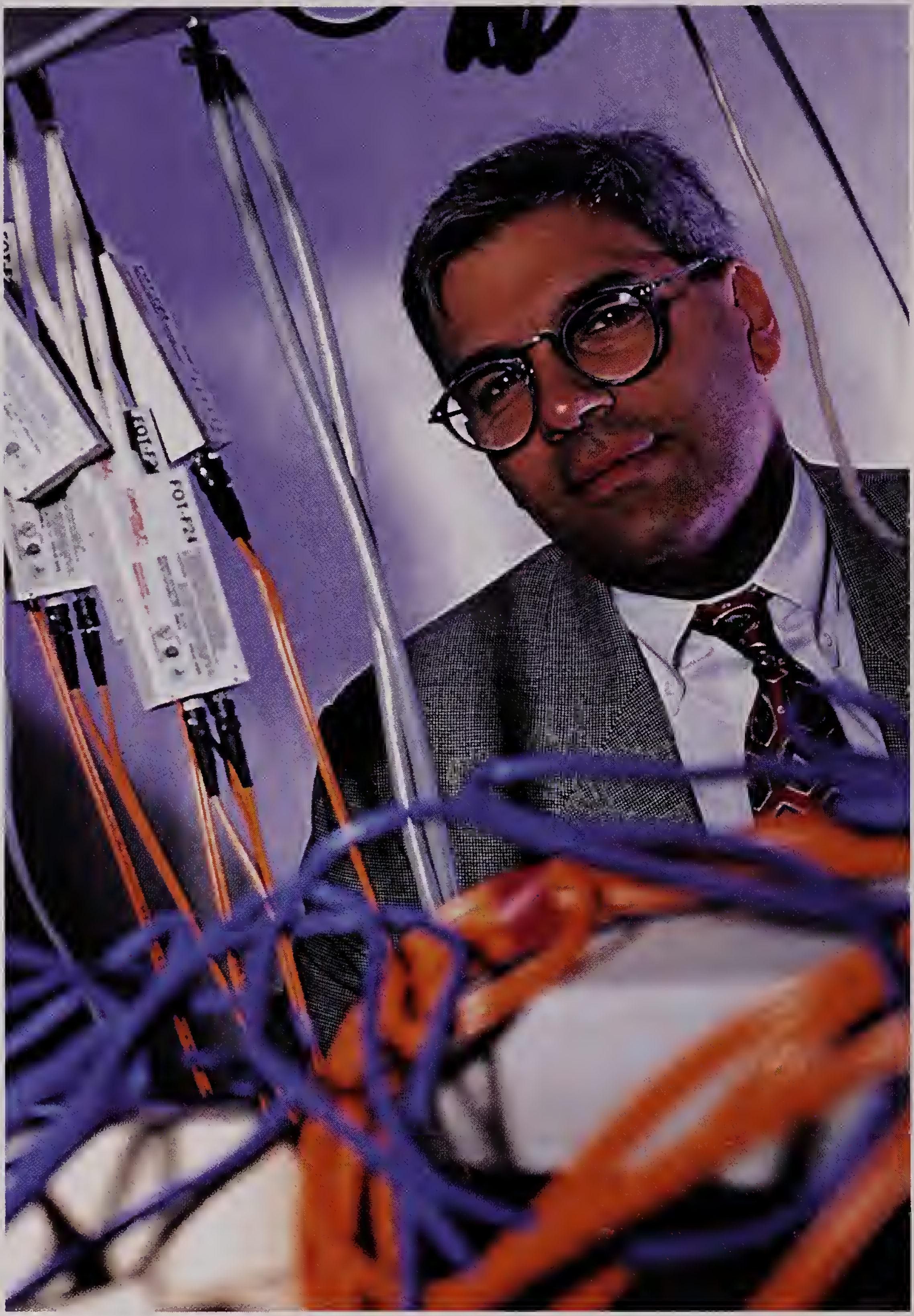

MATT GHOURDJIAN: *The firm's use of technology helped it win the Orange County proceedings.*

PHOTO BY LARA JO REGAN / SABA

Utah, lawyers can generate contractual agreements on the fly, complete with annotations. For example, the interactive system will walk a junior lawyer who is drafting an international trade agreement through the document-generation process with a series of questions appearing in dialog boxes. Paragraphs within the document are deleted, inserted or modified depending on the answers to the questions. An agreement is generated with the appropriate annotations right on the screen.

There are reasons technology has taken so long to catch on in the legal world. At firms with hundreds of associates, there is often a built-in economic resistance that's difficult to overcome. Traditionally, lawyers bill for their services by the hour. By improving efficiency, technology can take a bite out of revenues. "In the short term, the payoff may be a negative one," says Beck. "There may be a competitive advantage over the long term, but this argument doesn't wash with a 57-year-old partner staring at retirement."

Bartlit Beck has responded by changing its billing processes. A decreasing number of cases are handled on a strictly hourly basis. Instead, the firm charges by contingency fees, flat fees and performance- and task-based billing, depending on the nature of each case. While less time is billed, the cost of delivering legal services is also reduced.

At Hale and Dorr, lawyers didn't take to technology right off the bat, mainly because of the intense demands on their time. Womack recommends that the introduction of technology—whether a different platform or a new application—should be as "approachable" as possible. Having internal proselytizers who try out new technology and encourage their peers to use it has been very effective, he says.

Another way to convert the unwashed is to select the technology that best suits their needs. While the Sun Sparc workstations that Hale and Dorr lawyers use might seem more at home in an engineering concern, the primary reason the firm went with the platform was to manage and leverage desktop resources centrally. Because Suns run Unix, Windows and Macintosh tools, everyone can keep their favorite interfaces. "[One] problem with technology is getting knowledge workers acculturated to taking advantage of it," Womack says. "It's not my job to make anyone give up the machine they're used to."

Sometimes, though, it's necessary to push technology in less subtle ways. The 300 litigation lawyers at Howrey & Simon have to review depositions online because the managing partners have eliminated hard copies. Most are now proficient with 15 to 20 different desktop applications, including document management, Internet search tools and calendaring.

While some firms are using technology to gain a competitive edge, it's an advantage that's not likely to last. As has happened in other industries, sooner or later, the decision to use technology won't be a matter of choice as much as a means of survival.

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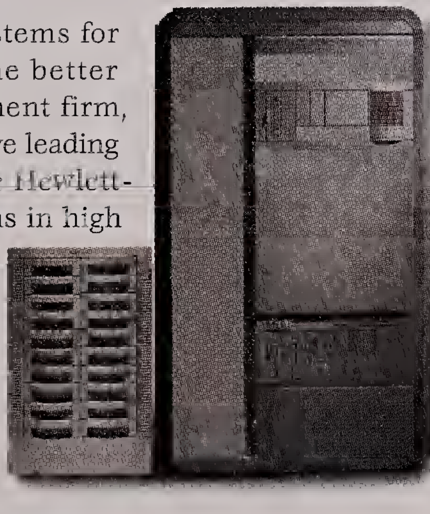

*"UNIX Products: An Analyst's Scorecard," November 7, 1994. Illuminata.
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MAGIC NUMBERS

Persuasive Sounds

As rival economic ideologies slug it out and policymakers look for easy answers to today's complex problems, one voice speaks out clearly against all the "fuzzy thinking" that abounds

BY E.B. BAATZ

Does "plain-speaking economist" sound like an oxymoron? If so, it's because there aren't many economists like Stanford University professor Paul Krugman. Able to cast off economic jargon and cut through academic baloney, he offers common sense and clear exposition on topics such as international economics that, in other hands, are sometimes confusing or, worse, dreadfully dull.

Calling himself a "technological determinist," Krugman is currently concerned about technology's impact on the country's rising wage inequality. In spite of productivity growth that has seen the average American worker produce about 25 percent more in 1993 than in 1973, young men without college degrees have seen their wages drop by 20 percent or more in the same period. At the same time, earnings of highly educated workers (like CIOs) have risen, and the incomes of the very rich (like CEOs) have exploded. Many theorize that this increasing wage differential is a result of global trade. Krugman argues convincingly that it just isn't so.

The real culprit, says Krugman, is technology. The future, though, looks hopeful to him. No technological fatalist, Krugman looks back to the 1770s and Britain's Industrial Revolution for signs that the growing income gap of the 1980s and '90s will be a temporary phenomenon. For the CIO, however, a future of unstoppable wage increases seems less likely.

In his latest book, Krugman explores the relationship between technology and productivity, globalization and wages, economic theory and politics. Written for the layperson, *Peddling Prosperity: Economic Sense and Nonsense in the Age of Diminished Expectations* (W.W. Norton & Co., 1994) also unveils the myth makers behind conservative supply-side economics and exposes the errors of the "strategic traders," the liberal counterparts to supply siders who advocate targeted industrial policy.

PHOTOGRAPHY BY JOHN HARDING

Krugman's previous books include *The Age of Diminished Expectations* and *Currencies and Crises*. He has also contributed articles to *Fortune*, *Business Week*, *Scientific American* and many other publications. The 43-year-old, MIT-trained professor was named "the most celebrated economist of his generation" by the British magazine *The Economist*. Between trips to Europe and moving into a new home in Palo Alto, Calif., he spoke last winter with *CIO* Senior Writer E.B. Baatz.

CIO: *In your 1994 book,* Peddling Prosperity, *you explore the possible causes—social, political and technological—of the economy's productivity slowdown. Productivity in the United States rose 2.2 percent last year. Has the current rebound shed any light on why investments in technology have not yielded greater increases in productivity, or what is commonly referred to as the "productivity paradox?"*

KRUGMAN: Yes. The single best explanation for productivity growth seems to be technological determinism; that is, that technological change determines productivity growth. I use "technology" in the economist's sense of the word: Anything that allows us to get more output per unit of input is an improvement in technology, be it networked computers or changes in the organization of work. The story that seems to make sense now goes something like this: Once upon a time, we had an interrelated set of technologies with a lot of potential—basically technologies that were introduced in the 1920s but not fully exploited until after World War II. We enjoyed a generation of wonderful economic growth that was driven not by dramatic technological change but by a rapid process of improvements within a given technological paradigm [of specialization and mass production]. We reached the limits of that by the early 1970s. Then along came our technological innovators with an even more miraculous set of technologies. It has taken us until just about now to figure out what to do with them.

> *"One thing that has gone seriously haywire in our economy is the tremendous increase in the inequality of incomes."*

CIO: *Newt Gingrich and his supporters base their political agenda on both the old supply-side economics idea and Alvin and Heidi Toffler's new* Third Wave *hypothesis, which says that technology will drive great positive changes in the economy and improve long-run productivity growth. Since you successfully debunk the supply-side ideology in your book, how sound are the underpinnings of the conservative revolution?*

KRUGMAN: I must say that I am shocked at what happened with the 1994 elections. I don't think the voters were really marking their ballots in favor of supply-side economics. The tax cuts during the Reagan years did none of the things they were supposed to do. We had an absolutely normal business-cycle recovery following the 1982 recession with no increase in long-run growth rates. Tax cuts produced deficits every bit as large as we expected. I find it hard to imagine the state of mind of the unrepentant supply siders.

I can't say exactly what the voters were voting for, but they certainly were not voting for the ideas of the Tofflers, either. What is really interesting about the Tofflers and Gingrich is that they are not actually free marketeers in the conventional sense. I was really struck, for example, by what the Tofflers had to say in their book about world commodity markets. They say that prices in commodity markets are arbitrary. They call it the "law of the first price" and say that whatever price a corporation originally sets when it first makes its deal with the unsophisticated locals sticks forever. That's just not true. The Tofflers have no sense of the logic of the marketplace. It is not clear at all that they believe in the precepts that make up a free-market advocate. They just happen to think

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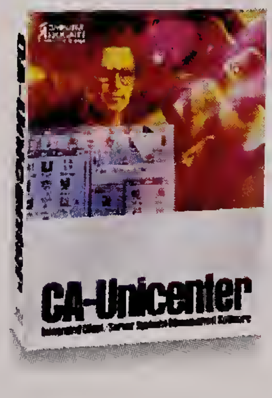

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that free markets are good for their favorite markets right now.

One thing you can say about the original supply-side group who came to Washington with Reagan is that they had a certain philosophical purity. Their victory was a serious victory for crank economics, but they had a consistent crank vision. What is happening now with the Gingrich-ites is a victory for just plain fuzzy thinking.

CIO: *One of your theories is that technological change has helped create rising wage inequality. After reading your book, it seems to me that businesspeople and many economists are guilty of fuzzy thinking on this issue, too.*

KRUGMAN: One thing that has gone seriously haywire in our economy is the tremendous increase in the inequality of incomes. The spread of incomes between people at the top tenth and those at the bottom tenth of the wage distribution scale is wider now than at any time since we began watching the numbers.

CIO: *And you say that the cause is not competition from low-wage global competitors?*

KRUGMAN: That story is tremendously appealing because it seems to make all the pieces fit together. But it's not accurate.

CIO: *Ross Perot's "great sucking sound?"*

KRUGMAN: Yes. The "great sucking sound" hypothesis, which is held by a lot of people who should know better, basically doesn't make any sense. It simply doesn't add up. Some believe that if productivity rises in countries that have very low wages, their wages won't rise; instead, the developing countries will just run huge trade surpluses. At the same time, because they have low wages, these countries will attract capital and, in the process, de-industrialize the Western industrialized nations. That's the myth. Very compelling. Except for one little problem—you cannot simultaneously run a huge trade surplus and be a big importer of capital. An accounting identity exists: Trade surplus plus capital account equals zero. The only answer that really makes sense is that as productivity rises, so will wages.

> *"The only answer that really makes sense is that as productivity rises, so will wages."*

CIO: *In fact, developing countries are running a trade deficit.*

KRUGMAN: They did last year. But certainly the way things are playing out so far is nothing like the stories that people are telling. There is going to be a fair amount of investment in developing countries, which will divert some investment away from industrialized countries, although probably a lot less than people think. And the more-developed nations as a whole will probably run trade surpluses because that's the other side of the coin. Countries in the developing world will see large productivity increases and large wage increases, as was the case in Japan and South Korea. The "great sucking sound" theory is a warning about how easy it is to say things that seem plausible—even compelling—about the world economy but that are, in fact, complete nonsense.

CIO: *Do other economists agree with you that trade is not the cause of America's widening wage gap? And if not trade, what is the cause?*

KRUGMAN: Estimates for how much the widening wage dispersal can be attributed to trade with newly industrialized countries can range anywhere from "very little" to "about 20 percent." And that 20 percent, economists agree, really stretches every assumption to the limit. There just isn't enough trade going on to

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explain the kind of dramatic wage changes we've seen lately. Wage inequality has risen so much that we need a big explanation. And that big explanation is purely domestic—it's technology.

You see it very clearly in the numbers. Over the past 20 years, we've seen a terrific increase of skill bias in the direction of technology. In 1980, companies paid a 35 percent premium for a college-educated worker with five years of experience over a non-college-educated worker. Now the premium is 80 percent. You would think companies would be trying hard to find ways of de-skilling jobs. Instead, it's just the opposite. The ratio of college-educated to non-college-educated workers has risen sharply in almost every industry, despite the fact that buying the services of a college-educated person has become far more expensive. That tells us that that there is some pervasive force that makes everybody need more skilled workers than even 15 years ago. That clearly has a lot to do with the information technology revolution.

CIO: *So you are saying that wage growth, or what economists call "the standard of living," is determined by technological change, not by global trade.*

KRUGMAN: Countries around the world are really *not* in a kind of economic war in which some win and some lose in the global marketplace. Suppose your country is half as productive as mine. Your country will still compete with mine if you have a product to sell that my country wants. But, because productivity determines wage growth, your economy's wage rate will be about half of mine and your standard of living will be half of mine. So it may sound as if you are "losing" because of competition. Now suppose that our countries had no trade with each other at all. Suppose your economy was on Mars. If your economy is half as productive as mine, your wage rate would still be half of my country's wage rate. It is always true that one wants higher productivity. It is no more or no less true because countries are selling in the world market.

CIO: *Surely productivity growth must be more important for those industries that face rivals in world markets?*

KRUGMAN: In terms of standard of living, it doesn't turn out that way. High productivity growth in industries that sell to the domestic market translates into a higher standard of living to exactly the same extent as high productivity growth in export-oriented industries. It's a big surprise traveling around Japan, for example, to notice that the country just doesn't seem all that rich. What is going on? The Japanese have, for a variety of reasons, concentrated their innovative activity and investment on export sectors. Unfortunately, because they are so surprisingly inefficient at everything else, the cost of living in Japan is extremely high. The standard of living of the average Japanese is still substantially lower than that of the average American and no higher than that of the average resident of England.

"Japan's bullet train appears to be a high-tech marvel, but it's actually a very labor-intensive business. It's an illusion."

CIO: *I don't think of the Japanese as being so inefficient. Their trains run on time.*

KRUGMAN: The trains run on time but at enormous expense. You may think of the bullet train, for example, as a high-tech marvel hurtling down the rails. What you miss is the fact that the bullet train does so much damage to the track that every night, thousands of workers are out there repairing the tracks. What appears to be a high-tech marvel is actually a very labor-intensive business. It is an illusion.

CIO: *The productivity paradox often seems like an illusion to me as well. I'm speaking of the problem with metrics. For example, economists massage val-*

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ue-added statistics [value added is a measure of output minus the value of inputs and is often used to help measure productivity], but do the numbers really tell us anything?

KRUGMAN: Value-added data hides two mistakes. First is the belief that our prosperity as a nation depends on our ability to pick the right industries. At least 70 percent to 80 percent of employment in an advanced economy is devoted to producing for the local market. So we shouldn't say, "Let's get out of low-tech sectors such as retail trade."

Second, something quantifiable like "high value added" sounds solid until you look closely. The question must be high value added *per what*? When I was in the government a dozen years ago, the agriculture department had a program to promote high value-added exports. In this case, we were looking at value added *per pound*. You can get some funny results. The highest value-added agricultural product turns out to be bull semen. High value added *per worker* sounds sensible until you start to look at those numbers. For example, the tobacco industry has the highest value added per worker, far higher than high-tech industries. A government policy that encourages only the export of goods from high value-added industries may have unintended implications for an economy.

> *"During times of technological change, some groups can do very well for a while, but their affluence is temporary."*

CIO: *So what's the future for wage inequality? Will it just keep getting worse and worse?*

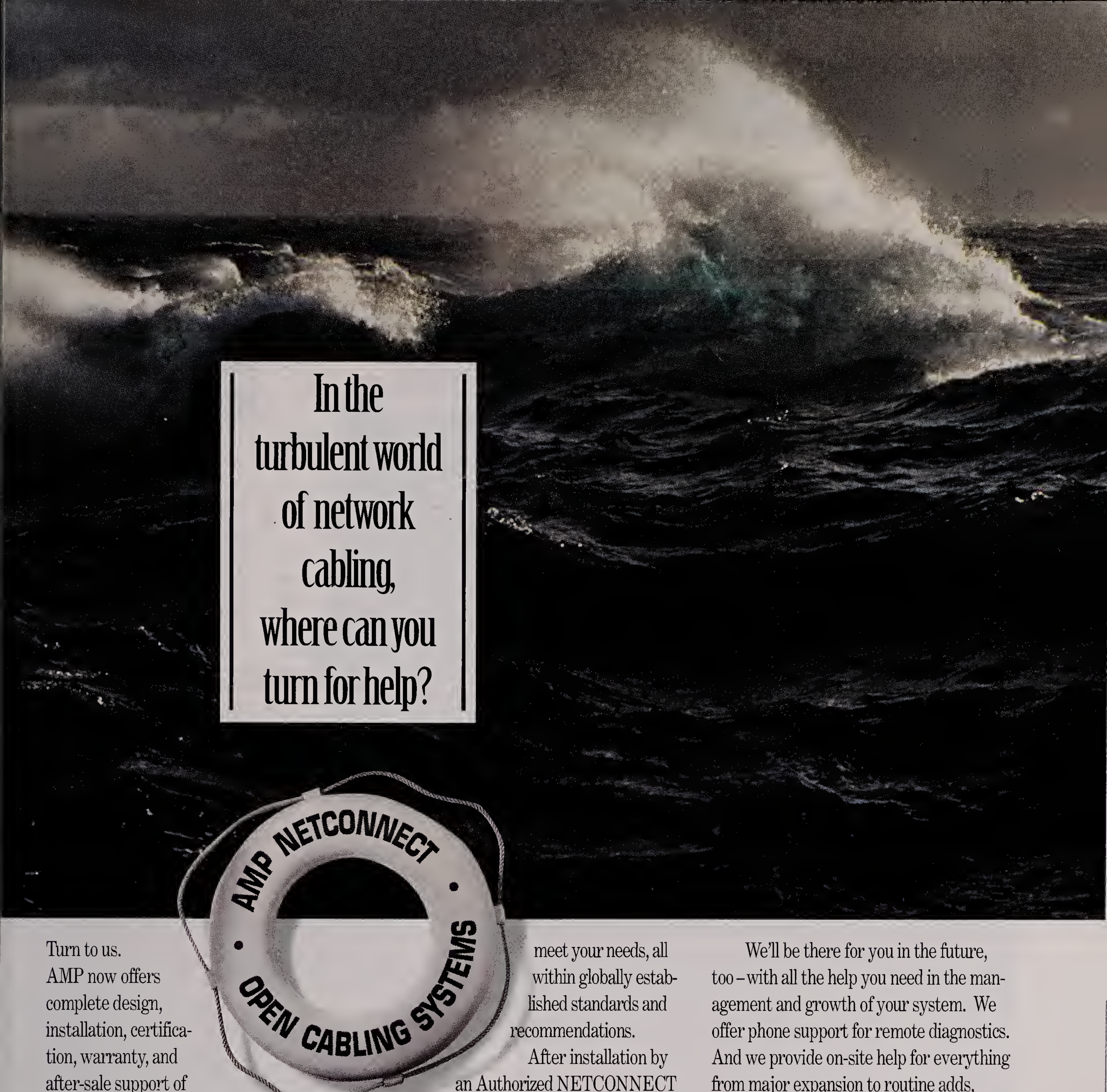
KRUGMAN: History shows us that we can have reversals in wage trends. After the Industrial Revolution, wages had begun to rise by the middle of the 19th century, although it took people some time to recognize it. By the middle of the next century, most of the Western societies had managed to create cultures that were more middle class and more decent than anyone had seen in human history. During times of technological change, some groups can do very well for a while, but their affluence is temporary. A classic example is the weavers in 19th century Britain. First, spinning was mechanized and weaving remained a hand occupation. Skilled weavers became very prosperous; they were the labor elite. Then, along came the power loom. Weavers suffered a crash in income. The Luddites, who wanted to smash all the machines, were not the poorest of the poor; they were the recently impoverished weavers smashing the power looms.

CIO: *Are you implying that computer programmers, technology consultants and chief information officers might face a reversal, too?*

KRUGMAN: Well, the microcomputer is a skills replacer. It is possible to imagine—and, in fact, quite likely—that over time the use of technology will become less dependent on skill. The premium on high-level, formal skills will be greatly reduced.

Computer visionary Marvin Minsky had an insight about that. He said that we are going to eventually rethink our notion of what is "hard" and what is "easy." We tend to imagine things like formal reasoning and programming computers as hard activities and things like gardening as easy. But when we do artificial intelligence, we find how difficult it is to get anything even remotely like common sense into a machine. The example Minsky gives is that we actually had computer programs that could invent and prove mathematical theorems in the 1950s, but today we still do not have anything that can reliably recognize a human face. And we have no idea when we might.

As technology becomes more sophisticated, it becomes transparent. I predict that as that happens more and more, ordinary human skills—things that everybody can do but that are very hard to put in a computer—will come into their own again. CIO



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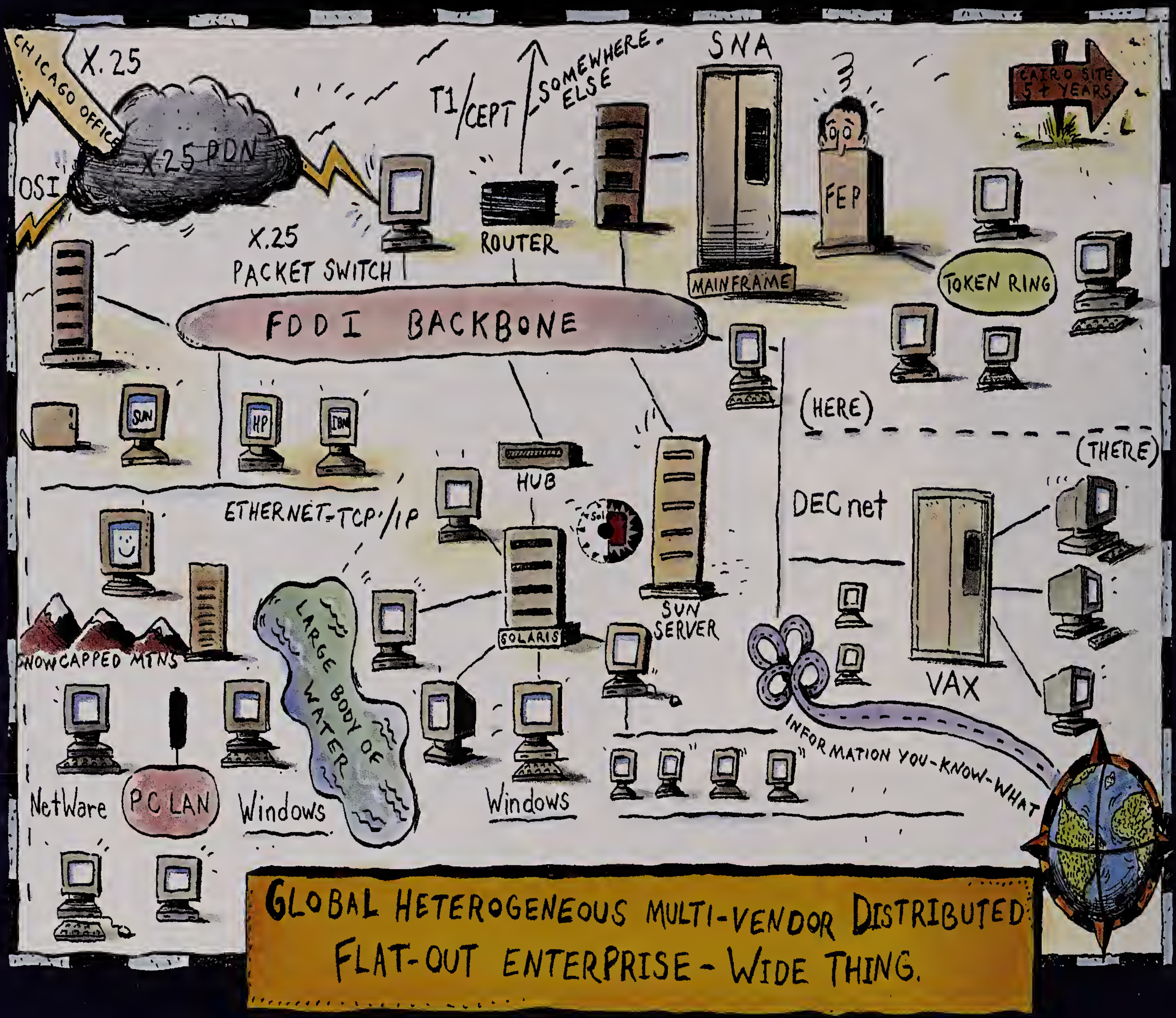

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Brave New World

Multimedia technology promises a journey into the future limited only by the imagination. But getting started will require some realistic planning.

BY ALAN R. EARLS

Interest in multimedia technology has been swelling since the early 1990s, when companies first began to explore ways to add first-rate sound, full-motion video and higher levels of interactivity to enhance applications. Home users, in particular, were among the first to be hit by the wave of whiz-bang products such as PC games and interactive educational programs for the family.

Riding the technological tsunami, business users eventually demanded access to the tools they had become accustomed to at home. Now Corporate America is diving into multimedia for reasons that go beyond worker demand. From information sharing to training, multimedia can mean dollars and sense for companies looking to enhance productivity.

Jeff Howell, Andersen Consulting Education's director of technology services in St. Charles, Ill., says that the switch from traditional seminars to a self-study business-practices course is saving Andersen Consulting some $10 million every year in training-related expenses such as travel and lodging. With that kind of demonstrated payback, he says, further development of multimedia is certain.

"Training and presentations are probably going to be the two largest applications for multimedia investments, followed closely by videoconferencing," predicts Bruce Ryon, principal analyst of multimedia for Dataquest Inc. in San Jose. "But it's important to note that, as a rule, multimedia will not be a networked phenomenon for now."

The decision to take on a multimedia development project can be daunting, to say the least. The first steps of project coordinators include gathering source information and developing an overall presentation and navigation scheme. From these early stages flow further decisions about the organization of information, the degree of interactivity and the types of screens to be developed.

A burgeoning selection of tools is fast becoming available to developers willing to take the plunge. Some of the best-known multimedia tools include IconAuthor (from Aimtech Corp. in Nashua, N.H.), Quest (from Allen Communication Inc. in Salt Lake City), and Director (from Macromedia Inc. in San Francisco). These tools are generally accessible to nonprogrammers and provide a template for creating multimedia from audio, video and text elements. However, as with any template, they may not provide an answer for every situation, and they offer no guarantee that an application will be as transportable—or polished—as demanded.

"There is a huge temptation for people to run out and buy a tool such as Director and say they have multimedia," says Brian Beams, director of media technologies at Andersen Consulting in Chicago. "The real challenge," he says, "is figuring out

ILLUSTRATION BY JAMIE HOGAN

what you want to do and what your network and desktop resources can support."

Many corporations are gearing up to do just that. Michael Carr, video production coordinator for Amoco Corp. in Texas City, Texas, has focused his attention on harnessing multimedia for OSHA-required inhouse training of refinery workers. Using mobile kiosks, Carr has developed a multimedia-based program that permits self-directed learning and supports his company's goal of just-in-time training.

"Our employees are already highly skilled people; we simply want to provide them with a refresher course before they tackle a major task," explains Carr. Programming was simplified because the training material already existed and the delivery environment—standalone identical kiosks with a single microprocessor each—was uncomplicated. When compared with those trying to implement multimedia applications across a complex network, Carr says his company's transition to multimedia has been "fairly painless." Working with a team of about a half-dozen people, including one or two "content" experts—people who know the ins and outs of OSHA regulations and refinery operations—Carr says the process has become almost routine.

> **"Training and presentations are probably going to be the two largest applications for multimedia investments, followed closely by videoconferencing."**
>
> *--Bruce Ryon*

Less routine, though, are attempts to develop and deliver multimedia in a networked environment. For now, multimedia development at Andersen Consulting is being focused narrowly on a particular business problem: the tremendous costs of training. The traditional approach to one key training program—the how-to business practices for the firm's army of consultants—was to physically bring more than 3,000 individuals to the company's St. Charles training facility each year. Not only did that mean significant expense, but trainers worried that much of the program was soon forgotten unless opportunities to apply the learning cropped up in short order.

An analysis of issues related to networking limitations led Andersen Consulting Education to focus on delivering multimedia by CD-ROM, explains Howell. His solution was to encapsulate the training on CD-ROM and move it to the field where

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*BASED ON WORLDWIDE CLIENT/SERVER ACCOUNTING SOFTWARE REVENUE MARKET SHARE Source: International Data Corporation (IDC), February, 1995

it could be utilized on demand, often just before being applied to real-world issues.

The same bandwidth problems that currently limit the Andersen Education project are also restricting the strategic goals at New York-based Dow Jones & Co. Inc., parent company of *The Wall Street Journal*. Developers wanted to turn the PCs and workstations of clients across the financial world into real-time video screens but discovered that networked multimedia technology couldn't currently deliver the bells and whistles associated with, say, a CD-ROM magazine or encyclopedia. For now, developers have settled on delivering only video to the PCs, allowing the company to begin to carve a market niche for itself by delivering special broadcasts of late-breaking financial news using traditional analog signals. "Our ultimate goal is to produce true multimedia products, including text and graphics," explains Simon Langdon, director of business operations for the company's multimedia division.

> **"The real challenge is figuring out what you want to do and what your network and desktop resources can support."**
>
> *–Brian Beams*

Langdon's biggest problem—and one faced by anyone trying to share full-motion video applications across a LAN—was that Dow Jones's customers were petrified by the prospect of sacrificing the huge chunk of bandwidth required to support digital video, especially when the functionality of mission-critical systems might be threatened. In response, developers built a traditional video delivery system that bypasses corporate networks entirely. It utilizes fiber-optic landlines, satellites, codecs (coder/decoder) and an external video box at each customer's computer or terminal.

Langdon is quick to admit that the system is heavily reliant on mature technology—something much akin to cable TV, except that an extra board is provided to run the signal on a PC's monitor. However, he notes, the content it delivers provides an entree for the company's service that can be broadened as technological developments permit. Once the bandwidth issues are resolved, he says, the company will be in place strategically to simply expand its offerings.

Eventually, bandwidth on networks should improve, says Dataquest's Ryon. He notes that the new availability of servers specially configured for

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Multimedia

How to Get There From Here

- Define what you want to accomplish
- Narrow your focus to a particular business problem
- Establish what your network and desktop resources can support
- Allow enough time to create an application
- Involve a broad range of skill sets and perspectives in the development phase
- Don't limit product creation to programmers
- Consider outsourcing some or all of the work, depending on the quality and quantity of your internal resources
- Be sure to clarify standards issues early
- Avoid taking new projects into legacy areas or across networks
- Don't be afraid to ask for help

video and multimedia signals will help make LAN applications more practical, at least within some corners of the organization. Multimedia servers organize network access, bus speed, disk access and other functions to support smooth delivery of bulky audio and video files to multiple end users.

Longer term, Doug Tsui, director of marketing for First Virtual Corp., a multimedia server firm based in Santa Clara, Calif., predicts that those bandwidth problems will be erased completely by new technology. His firm is focusing on ATM (asynchronous transfer mode), which permits transmission of chunks of video that are more manageable for networks in near-real-time. "We believe this technology will permit true multimedia at a per-seat cost of less than $800 much sooner than anyone thinks," he says.

"Costs for multimedia tools are dropping rapidly," agrees Ken Christie, vice president of marketing for the Annapolis, Md.-based Interactive Multimedia Association. "That includes costs for authoring tools as well as the tools that help shoehorn audio, video and text into multimedia-ready forms."

Thanks to downsizing efforts that have stripped many companies of their media departments, says Ryon, "the vast majority of content will be

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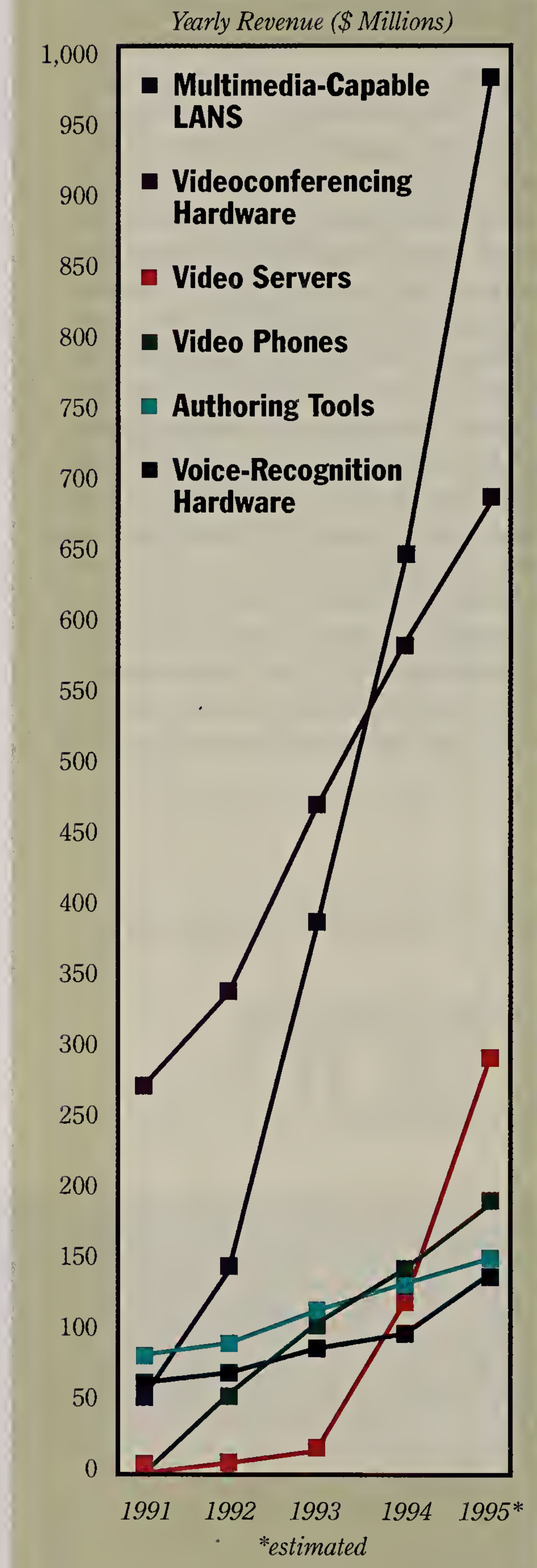

SOURCE: DATAQUEST INC.

developed out of house.” Eventually, more and more of the actual programming work may end up coming back to organizations, he adds, “because they know the company infrastructure—where the bandwidth choke points are, for instance, and how to transmit bulky video files with the least impact on operations.”

Organizations feeling the lure to develop multimedia applications internally, however, should be prepared for some rough seas ahead. While much of the development work can now be done within high-level authoring environments such as Quest or its competitors, there are still more than enough complexities waiting to snare the uninitiated.

Bob Warren, director of interactive media for Atlanta-based Convergent Media Systems Corp., can rattle off a list of obstacles awaiting would-be developers. For starters, he says, many companies underestimate the time required to create multimedia applications.

“There are two kinds of programs for creating multimedia,” he says. Programming languages, such as Visual Basic, provide the most power and can result in the most impressive end products, but they require enormous amounts of labor and skill. On the other hand, says Warren, a phalanx of authoring tools on the market permit a much more structured “foolproof” approach to development. They are less labor-intensive, but each has a personality that must be learned thoroughly to ensure good results.

Another temptation for CIOs, Warren notes, is to treat multimedia as just another traditional programming task such as porting a database to a new platform. “I don’t think it is an exaggeration to say that the visual complexity of multimedia applications is an order of magnitude greater than other types of applications,” he says. “Many programmers who are considered technically competent aren’t necessarily equipped to create appealing programs in this new medium.”

At Convergent, says Warren, the solution has been to create autonomous teams that include programmers who are sensitive to issues of interface and content paired with writers and graphic designers who are computer literate.

In addition, says Warren, there is still a Babel of input standards to consider. Indeed, the Interactive Multimedia Association, in a drive to head off a consumer revolt, has launched what it calls the Parallax Project to try to sort out differences within the industry. Graphic files may come in TIFF, GIF, BMP and DIB, for example. Video and audio also have their own sets of competing forms. Once the files have been translated into the standard of an application, there remain further questions about how to present and transmit the application. For CD-ROM storage, more than half a dozen formats exist.

Warren also notes that simply sorting out the competing multimedia standards of the Macintosh and Windows worlds—the two principal development environments—can be a challenge all by itself. When companies want to add in linkages via LANs or porting to legacy platforms, the complexity of the programming issues can become truly overwhelming.

David Conti, director of marketing communications for Aimtech Corp., maker of IconAuthor, a popular Windows-based authoring tool, says that vendors are hard at work solving these problems and making multimedia more robust. For instance, says Conti, the arrival of specialized video servers is part of the industry’s efforts to preserve the value of existing desktop investments. “Customers don’t want to play platform roulette” just to get multimedia, he says, nor do they want to reinvent applications for each environment. “Customers want the ability to just drop content into multimedia applications,” he adds.

Until multimedia gets that easy, however, developers may want to bear in mind some hard-won rules of thumb developed by Andersen’s Howell. He advises developers to engage as broad a range of skill sets as possible in the development effort and encourages novices to ask for help from outside experts. Most important, he says, is to start with the end in mind. “Don’t get enamored with the technology and lose sight of your business goal,” he warns.

Alan R. Earls is a freelance business writer based in Franklin, Mass.

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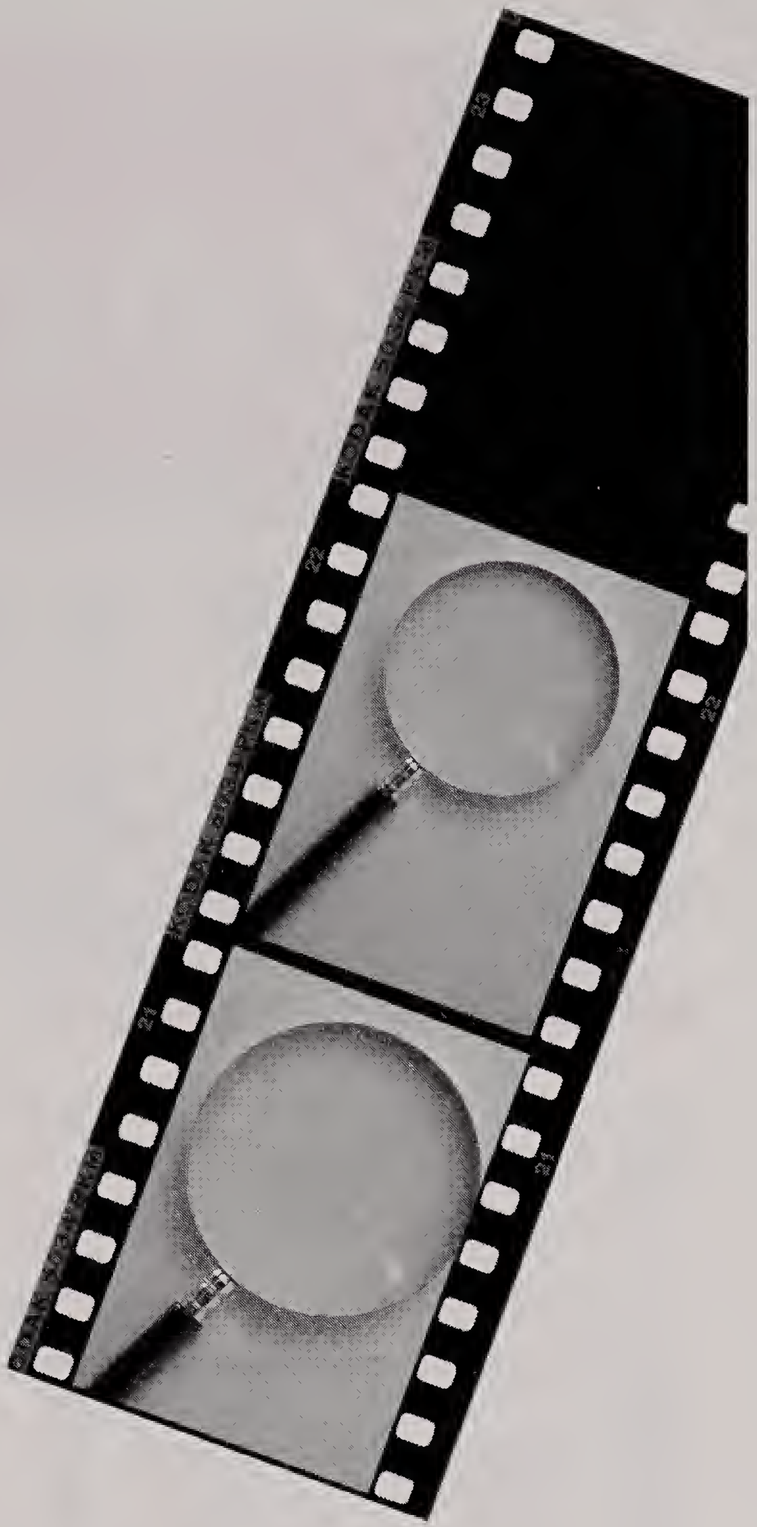

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Keeping Track

PeopleSoft Inc., the company that broke open the client/server applications market in 1989 with its human resources management product, may want to consider a name change. After branching off into financial management software and development and reporting tools, the company is venturing into another non-HR sector with its PeopleSoft Distribution client/server product line.

Targeted at the logistics and materials management function, the initial releases of the line will manage purchasing and inventory, with order management and distribution requirements planning promised for the second half of 1995.

The company also announced a new version of its Financials software, this one targeted at public-sector and nonprofit users. Developed with Andersen Consulting, the software addresses the needs of organizations that must deal with unique accounting and regulatory practices. Financials for Public Sector includes functionality for fund accounting, budgetary controls, encumbrance accounting, and project and grant tracking.

Pricing for all PeopleSoft product lines starts at $100,000. Contact the company in Walnut Creek, Calif., at 510 946-9460.

Don't Judge a Notebook by Its Cover

A portable computer should be just that: portable. So Somers, N.Y.-based IBM Personal Computer Co. decided to think small and expandable when it developed its newest line of laptops.

Small enough to fit in a briefcase with room to spare, the IBM ThinkPad 701C weighs 4.5 pounds and measures less than a sheet of typing paper when closed. With an extendible keyboard that spreads and interlocks, the ThinkPad 701C widens when opened to form a full-size, 85-key typing surface nearly two inches wider than the unit itself. The machine's 10.4-inch diagonal display is available in either active-matrix TFT or dual-scan color.

Although compact, ThinkPad 701 features a 486 Intel DX4/75 processor with 8MB of standard memory (expandable to 24MB). Other models use the 486 Intel DX2/50 processor with 4MB of RAM (expandable to 20MB).

Plugged into a phone jack, the ThinkPad 701C works as a full-function speakerphone, answering machine and fax machine. Built-in infrared capability lets users print documents and send files—with no wires or cable connectors—to other infrared-compatible notebooks, printers and electronic organizers.

The 701C is equipped with more than 15 preloaded software titles; some models are preloaded with OS/2 Warp in addition to DOS/Windows, offering customers a choice of operating systems at no extra cost. The ThinkPad 701C and 701CS—the dual-scan color model—are available in eight basic configurations. IBM PC Direct prices for the 701 series start at $3,799. For more information, call IBM PC Co. at 800 772-2227.

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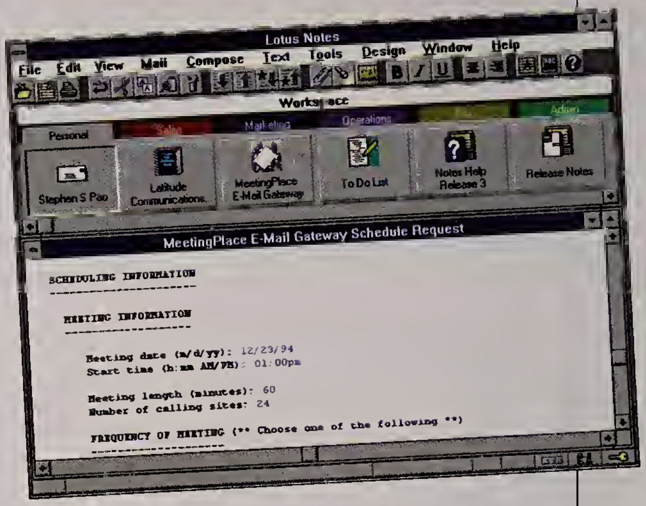

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Meeting length (minutes): 60
Number of calling sites: 24

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Arranging group audioconferences with your own PBX can be an experience in vocal frustration. The pros do it better, but service bureaus can charge an average of 53 cents per minute per person. A better option might be customer-premise software that manages the technical connections and the "virtual meeting" arrangements via the participants' desktop e-mail systems.

Latitude Communications purports to offer the first audioconferencing/e-mail integration system with its MeetingPlace E-mail Gateway. Besides establishing phone connections, the software will automate the steps of setting up an audioconference, including scheduling, notification, communication of agendas and distribution of meeting materials, all via e-mail messages and attachments. During the conference, an onscreen list of call participants highlights the current speaker.

Pricing ranges from $1,600 to $18,000, depending on the configuration and capacity of the system, which can accommodate 8 to 120 ports. Average operating cost is 25 cents per minute per user, according to the company. The software requires a 386 PC with Microsoft Windows 3.1, operates over Ethernet and TCP/IP networks, and supports cc:Mail 2.0 and Lotus Notes 3.0. Contact Latitude at 408 988-7200.

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The Hot Seat Again

According to the eighth annual CSC survey of critical IS issues, CIOs are as beleaguered as ever

Rapid change, intensifying competition and demanding customers continue to make managing an organization's information assets in the mid-1990s a tremendous challenge. According to the eighth edition of the "Critical Issues for IS Management" study from Computer Sciences Corp., senior executives' relentless pressure for more speed and flexibility in their IS departments—and their apparent impatience with their IS chiefs—is keeping CIOs off-balance as they struggle to find better ways of supporting dynamic corporate initiatives with the appropriate technology. Responses from 603 senior IS executives reveal three main trends that show just how difficult it is to be an IS executive in 1995:

Job security is at a premium. Top management wants results and, apparently, is not willing to wait long to get them. More than one-third of the companies surveyed have changed or replaced their senior-most IS executive in the past two years. The largest percentage of replacements (46 percent) were recruited from outside the company, while just 21 percent were promoted from within the IS department.

Reengineering initiatives are maturing. For the first time in five years, reengineering did not finish number one or two on the list of top IS management concerns. However, it continues to be a popular business response to competitive pressures. As organizations begin implementing their reengineering solutions, the pressure is on IS to deliver the systems necessary to derive the full benefits of reengineering. Because a principal tenet of reengineering is the need to break down traditional functional boundaries, it is not surprising that "instituting cross-functional information systems" moved from fourth last year to second on the list of top IS concerns. As reengineering implementation efforts gain momentum, this issue should remain an important area of focus for CIOs. Likewise, the increasing importance of technology's ability to help businesses compete will keep CIOs' attention focused on aligning technology initiatives with corporate goals.

Supply-chain management concerns have filtered down to IS. As fickle consumers' demands for superior service and value send shock waves throughout the supply chain, manufacturers and retailers alike are scrambling to serve customers better and reduce the time and cost of moving goods. That fact is not lost on CIOs. Connecting to customers and suppliers—which has languished at or near the bottom of the list of IS concerns since its inclusion in the survey—is suddenly a top-10 issue. Customer service, order processing and delivery/logistics are the three most critical business processes *and* the top targets of corporate reengineering initiatives. And technologies instrumental in achieving customer/supplier linkage—client/server, network integration and electronic data interchange—are most critical.

Those pressures aside, CIOs *can* take comfort in the fact that they apparently will have some cash behind their plans. Reversing a six-year trend of progressively smaller IS budget increases, this year's respondents projected a mean budget boost of 4.64 percent—double that of 1994. Still, as more reengineering efforts reach the implementation phase and competition dictates the pace of technology adoption, CIOs continue to face an imposing challenge: getting even closer to the business while strengthening the technology base upon which that business is built.

By James P. Saviano, *chairman of Computer Sciences Corp.'s Consulting & Systems Integration unit, Waltham, Mass.*

Top Management Issues for 1995

	1995	1994	1993	1992	1991
Aligning IS and corporate goals	1	2	2	1	2
Instituting cross-functional information systems	2	4	4	6	3
Organizing and utilizing data	3	3	4	4	5
Implementing biz. reengineering	4	1	1	2	1
Improving the IS human resource	5	9	12	5	13
Enabling change and nimbleness*	6	■	■	■	■
Connecting to customers/suppliers	7	16	16	20	15
Creating an IS architecture	8	5	7	3	8
Updating obsolete systems	9	7	8	18	■
Improving the systems-development process	10	6	3	9	4

*Added this year ■=Not ranked that year SOURCE: COMPUTER SCIENCES CORP., CAMBRIDGE, MASS.

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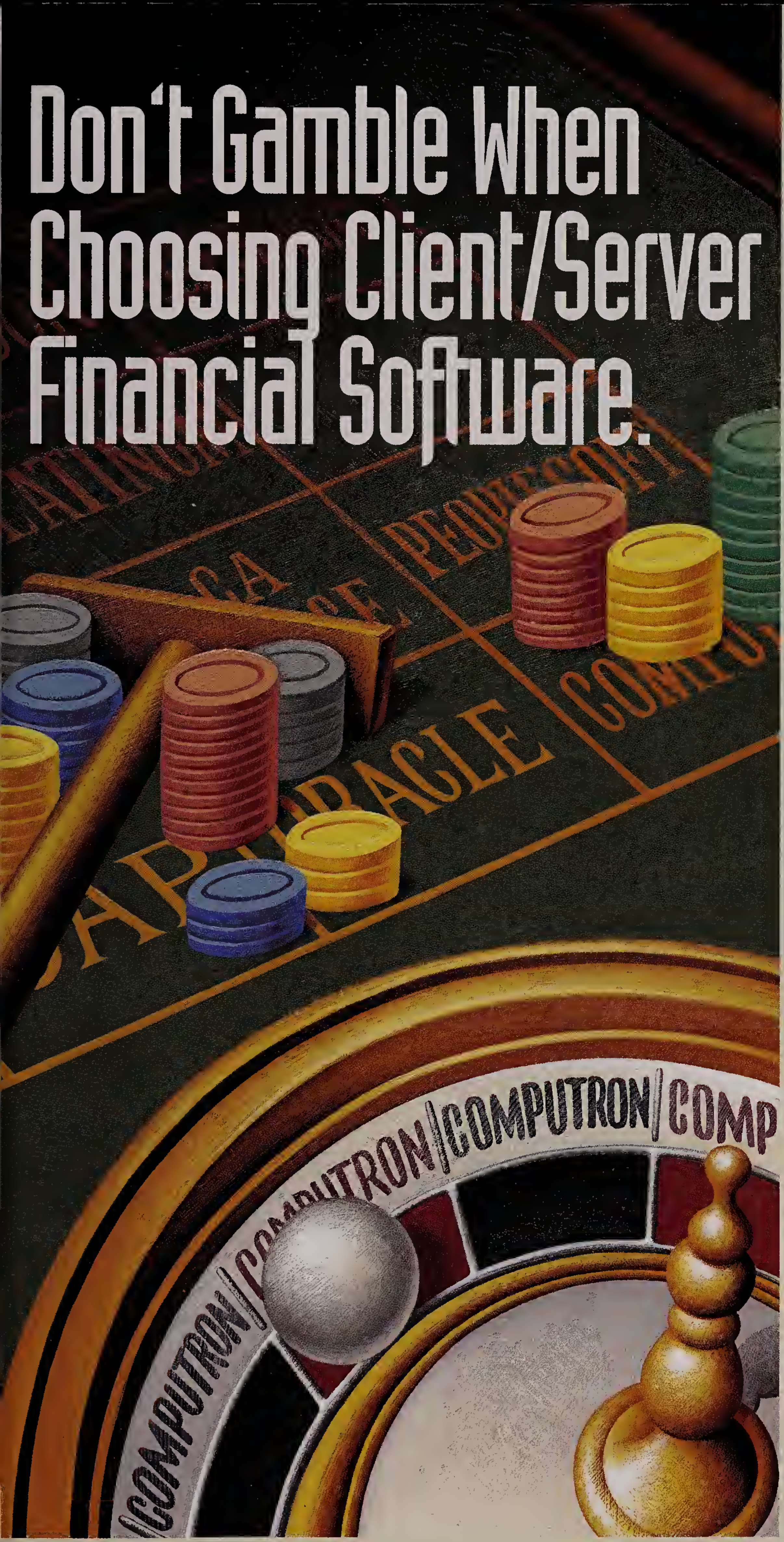

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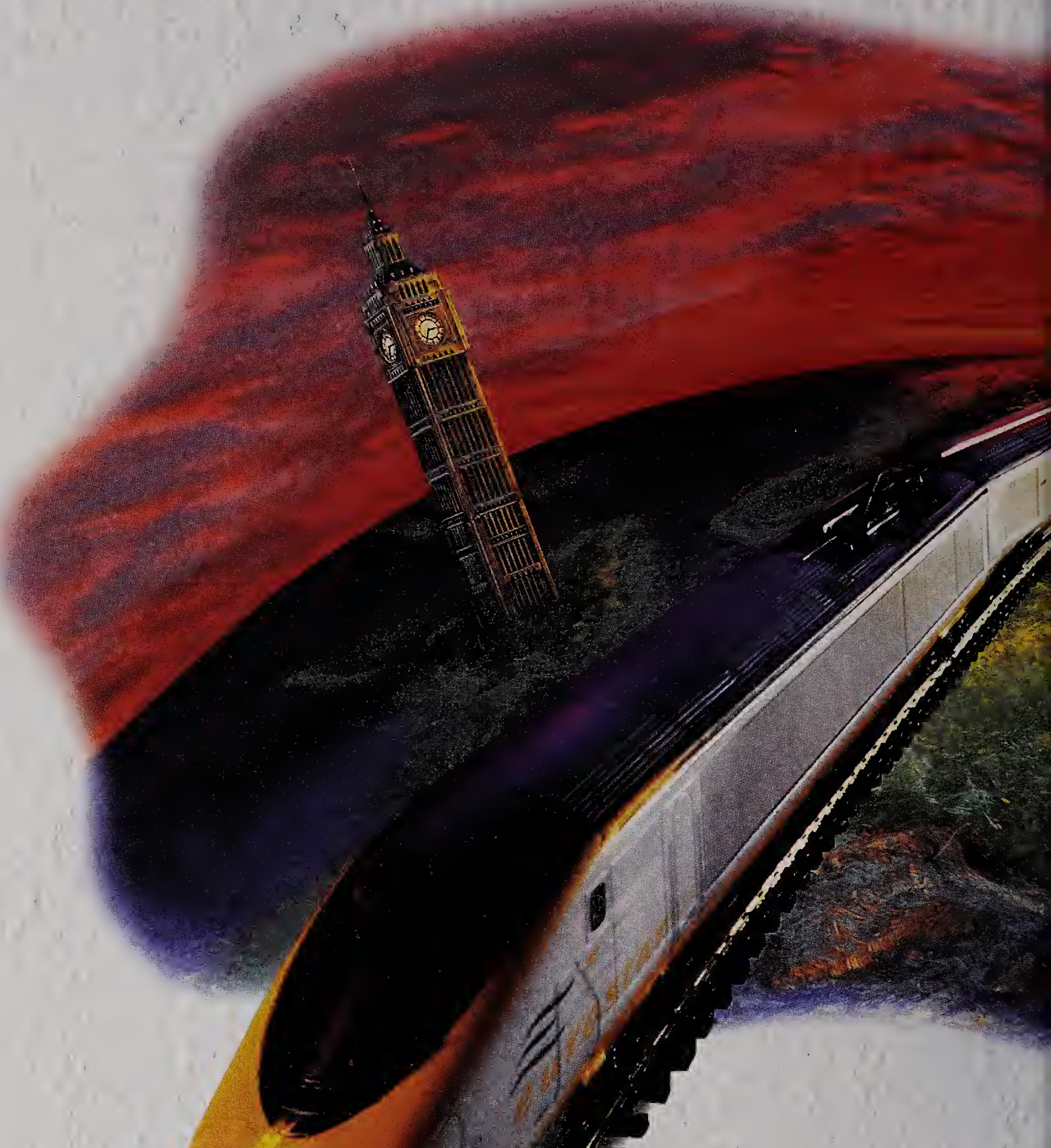
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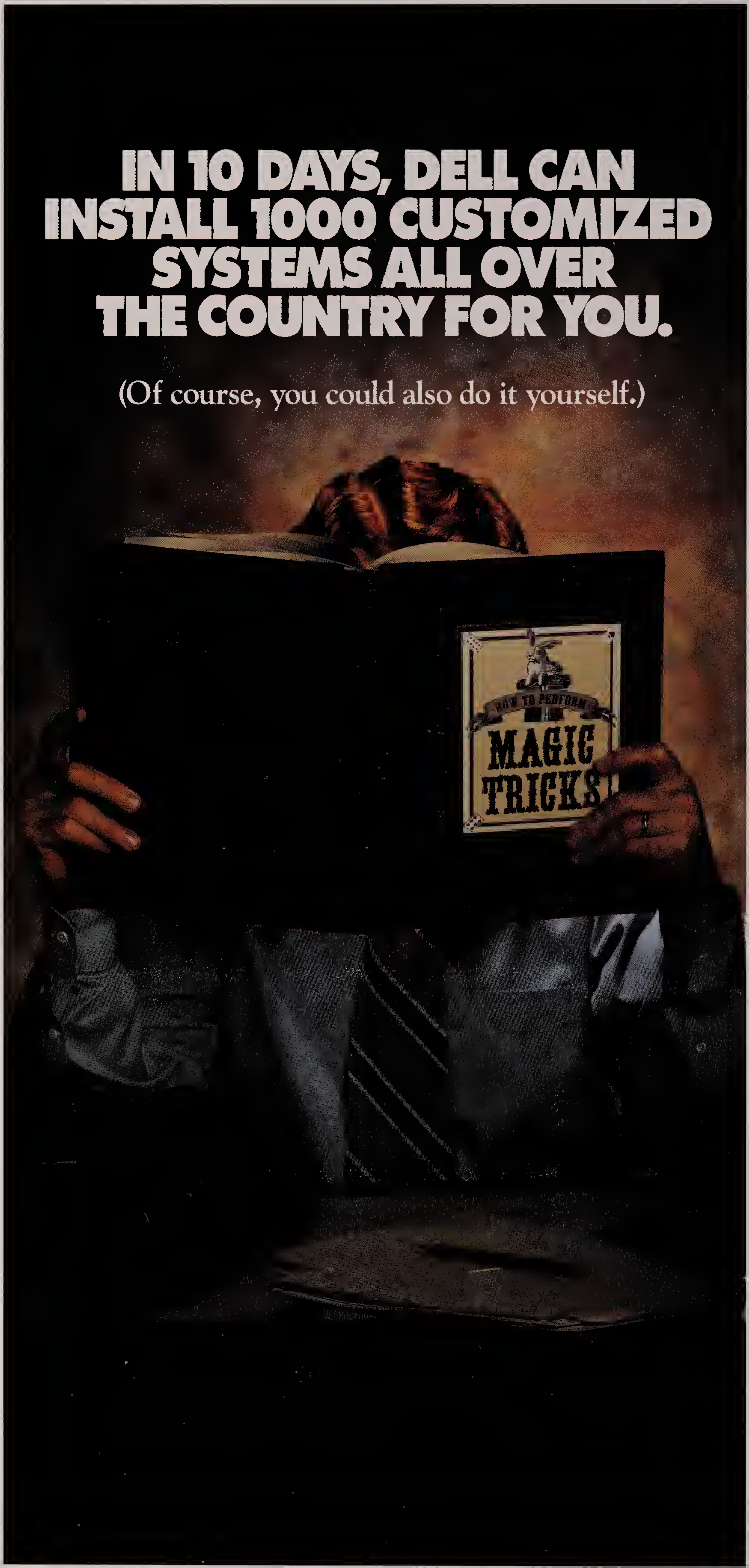
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